VANTAGE

Plant Design

Review

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Revision History

Date	Version	Notes
April 2003	6.1	Manual updated to reflect major changes to the Graphical User Interface at this version of Review. Details of improved support for internationalisation also added.
March 2004	6.2	Radical changes to GUI, principally affecting display navigation, grouping, materials keyplan/lighting, cameras and animation paths. Also introduction of Movement Handles.
August 2005	6.2.1	Miscellaneous additions and corrections.
October 2005	6.2.SP1	Miscellaneous additions and corrections.

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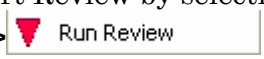
1 Introducing Review

1.1 Starting Review

Start Review by selecting **Start>Programs>AVEVA>VANTAGE Plant Design Review 6.2>** 

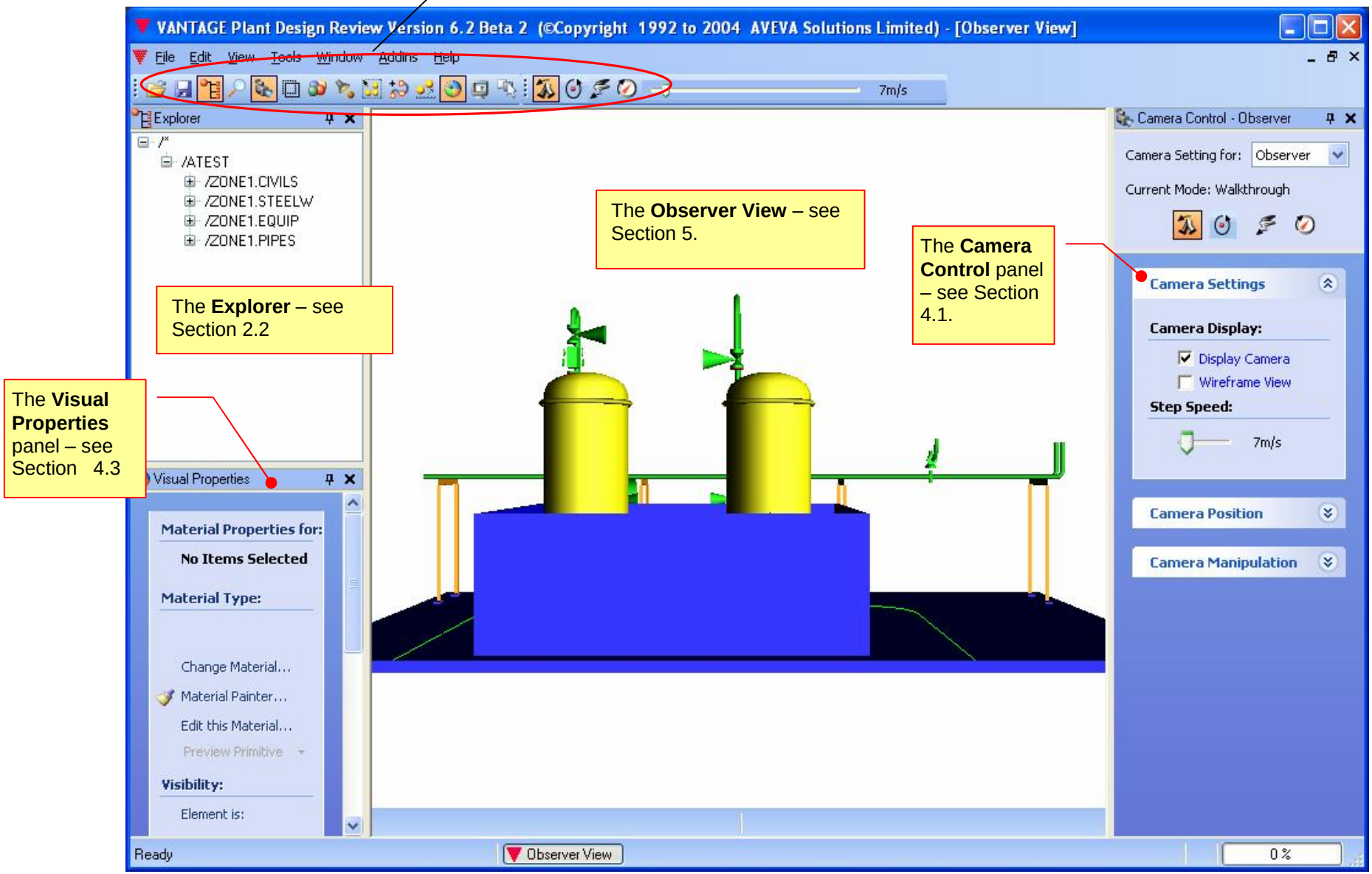
Exercise:

Start Review now. You should see the main **VANTAGE Plant Design Review** window. The remainder of this Section assumes that you have this screen display in front of you as you read.

1.2 The Main Review Window

The Review window and a typical selection of its different *panels* are illustrated overleaf.

The **view manipulation panels** are described in Section 3.


The **Menu Bar** and **Toolbar** – see Section 1.3
VANTAGE Plant Design Review Version 6.2 Beta 2 (©Copyright 1992 to 2004 AVEVA Solutions Limited) - [Observer View]
File Edit View Tools Window Addins Help
7m/s
Explorer
/*
/ATEST
/ZONE1.CIVILS
/ZONE1.STEELW
/ZONE1.EQUIP
/ZONE1.PIPES
The **Explorer** – see Section 2.2
The **Visual Properties** panel – see Section 4.3
Visual Properties
Material Properties for:
No Items Selected
Material Type:
Change Material...
Material Painter...
Edit this Material...
Preview Primitive
Visibility:
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Camera Control - Observer
Camera Setting for: Observer
Current Mode: Walkthrough
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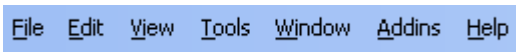
Camera Settings
Camera Display:
Display Camera
Wireframe View
Step Speed:
7m/s
Camera Position
Camera Manipulation
Ready
Observer View
0 %

1.3 The Menu Bar and the Toolbars

You can access all Review's functions from the menu bar:

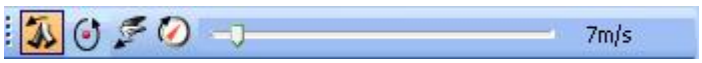


Each of the menu bar options are explained in detail later in this User Guide.

Note: The exact content of the **Edit** and **Tools** pull-down menus varies according to which of the **Observer View** (see Section 5) or other Camera Views (see Section 6) is active.

You begin access to many of Review's functions by clicking on one of the buttons in the **Standard Toolbar**:

The way in which the view manipulation features of Review work is controlled from the **Navigation Toolbar**:



The function of each of the buttons on the two toolbars is explained in detail later in this User Guide, but in summary:

1.3.1 The Standard Toolbar

	Open	Loads a Review *model file* into Review. Other Review file types can also be loaded, see Section 2.
	Save	Saves a Review *settings file*. See Section 14.
	Explorer	Brings up the **Explorer** form, which provides a hierarchical view of the PDMS elements imported in the model file. See Section 2.2
	Search	Enables you to search for elements within the model files currently loaded into Review – see Section 4.4.

	Open	Loads a Review *model file* into Review. Other Review file types can also be loaded, see Section 2.
	Camera Definition	Allows you to define the view by entering explicit positions and directions or by manipulating the line of sight interactively. See Section 4.1 for details.
	Keyplan View	Allows you to define the view by manipulating small-scale plan and elevation views of the model. See Section 6 for details.
	Material Definition	Allows you to assign a material to each displayed element, and give the material properties such as shininess, smoothness and texture. See Section 8 for details.
	Lighting	Allows you to control the *lighting* applied to the view by specifying the positions, colours and intensities of the light sources. See Section 10 for details.
	Groups	Allows you to link displayed elements together into groups, so that you can manipulate them collectively. See Section 12 for details.
	Path Editing	Allows you to define and an *animation path*, An *animation* can then be played along the path – see Section 4.5.
	Animation	Allows you to define an *animation* by setting up a progressive sequence of views.
	Visual Properties	Allows you to view or change the material properties of a selected element – see Section 4.3.
	Applications	Brings up the **Review Applications** form, enabling you to type in command syntax or perform queries. If your system has been customised by the addition of company-specific Review applications, this button gives you access to the menus and forms designed to control those applications. For details of how to proceed, refer to any relevant documentation produced when such applications were written.
	Advanced Picking Mode	Allows multiple selections to be made in the **Observer View** (with **Ctrl** held down). See Section 11.1 for details.

1.3.2 The Navigation Toolbar

	Walkthrough Mode	Rotate and Pan operations take place relative to the observer as he 'walks around the model'. See Section 5.1.2 for details.
	Fixed Focus Mode	Rotate operations take place about a fixed focal point. See Section 5.1.6 for details.
	Flythrough Mode	Allows the user to fly around the model. See Section 5.1 for details.
	Classic Mode	Rotate, Pan and Zoom operations operate as in Review version 6.1 and version 5.3. See Appendix A for details.
	Slider	Controls the speed of walk and zoom operations.

2 Importing a Model File for Viewing

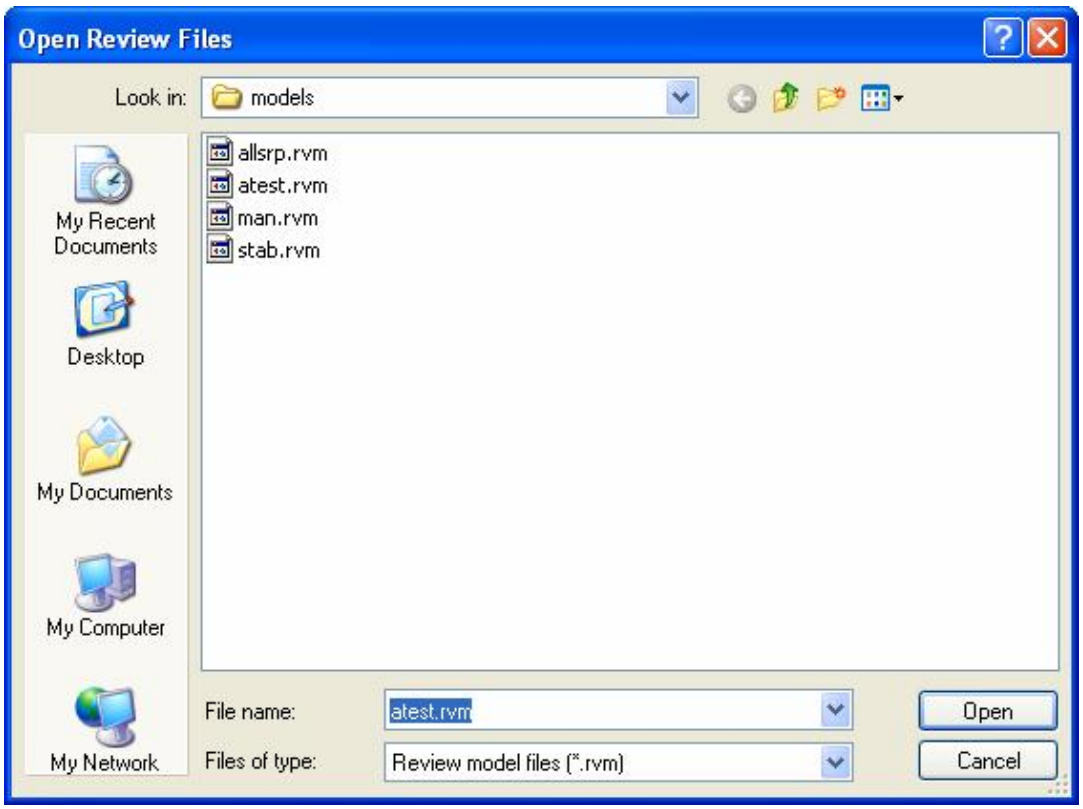
Review data is generated from a PDMS database and is called a *model file*. The model file contains:

- The design model geometry; that is, the dimensions and locations of all primitives that make up the design.
- The logical design hierarchy; that is, the family tree showing the owner-member relationships between named design elements.

The released software includes three sample model files, **atest.rvm**, **stab.rvm**, and **allsrp.rvm** (as well as **man.rvm**, the 'scale man') which you may load in order to practise using Review. You will probably recognise these models if you have attended a PDMS basic training course.

2.1 Loading a Model File into Review

To load or import a model file into Review from any accessible source directory, first click the **Open** button on the toolbar. An **Open Review Files** form will be displayed:



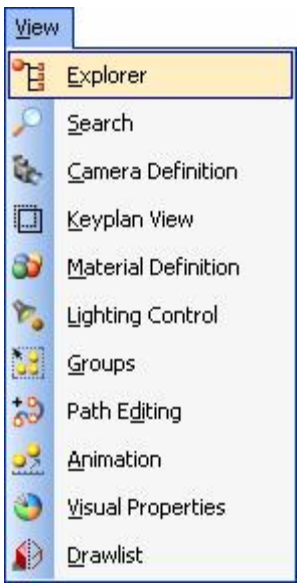
The **Open Review Files** form is a standard Windows **Open** dialog box and functions in the same way. The following file types can be imported:

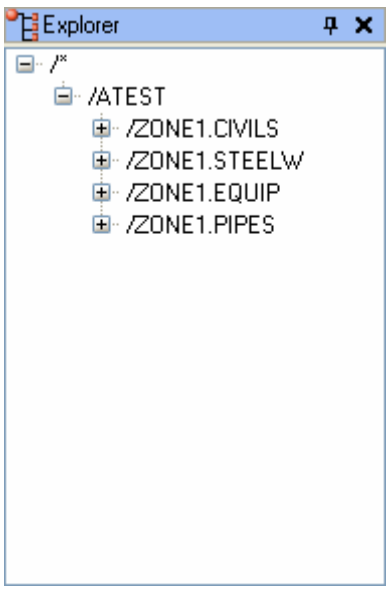
File	Purpose
Review *model file* (.rvm)	A standard model file, exported from PDMS.
Review *status file* (.rvs)	A binary file which holds display configuration settings from one Review session.
Review file (.rvm, .rvs)	(Both .rvm and .rvs files will be listed in the file browser.)

Exercise:

Import the file **atest.rvm** from your Review installation.

2.2 The Explorer





The **Explorer** provides a hierarchical view of the PDMS elements imported in the model file.

Click on the expansion box (⊞) to expand a hierarchy (the box changes to ⊟); click on the ⊟ to close up the hierarchy.

The **Explorer** operates similarly to the Windows Explorer, although the shortcut menu options accessed from the right mouse button are different.

Menu Option	Function
Dynamic Focus On	Moves the camera to the selected element, with dynamic movement, and looks at it. The dynamic movement animates the camera from the start position to the end position.
Focus On	Moves the camera to the selected element and looks at it.
Look At	Reorientates the camera to look towards the identified element but with no movement of the camera.
Move Close To	Moves the camera to a short distance away from the identified element and looking at it. Unlike **Focus On** commands this operation does not attempt to fit the item in into the graphics window.
Copy	Captures the associated element name, which can then be used when defining *look towards* views, *clip volumes*, *groups* etc. See later in this User Guide.

You can select multiple items in the tree as long as they are siblings of each other. Multiple selections are created using the standard Windows **Ctrl** for add-ing to a selection and ⇧ for a range selection when selecting elements.

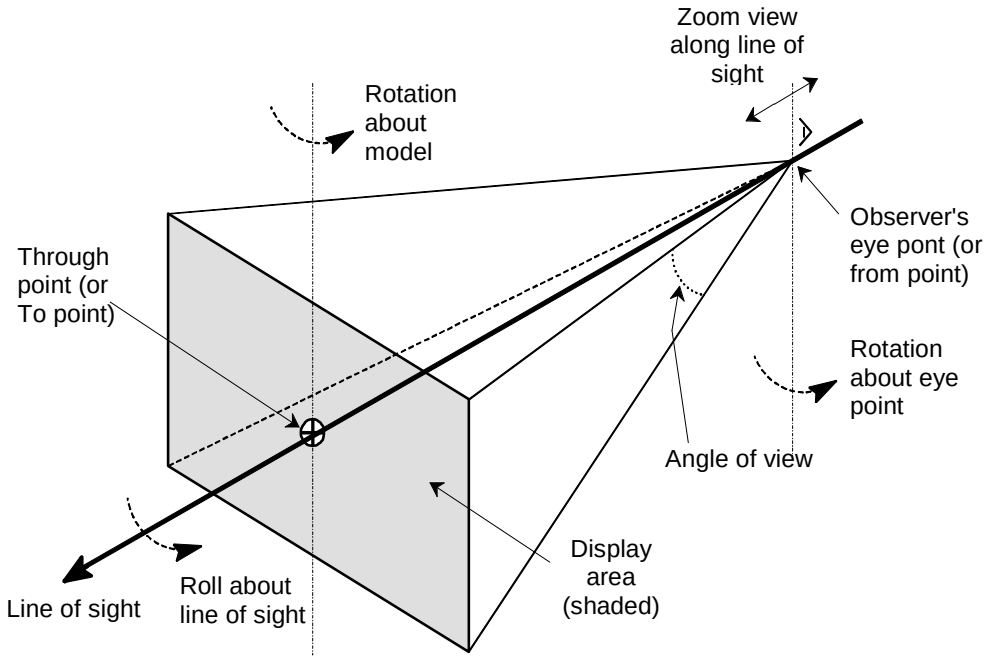
3 The Observer, the Cameras and the Model

The content of the displayed view depends upon four chief factors:

- The location of the *observer* (you) or *camera* positions.
- The location of the design model.
- The orientation of the design model with respect to the viewer.
- The angle of view of the observer or camera lens.

3.1 The View Pyramid

The view of the model which you see in the **Observer View** window depends on the settings of a number of view geometry parameters which together constitute a *view pyramid*, thus:


Zoom view along line of sight
Rotation about model
Observer's eye pont (or from point)
Through point (or To point)
Rotation about eye point
Angle of view
Display area (shaded)
Line of sight
Roll about line of sight

The key features of the view pyramid are as follows:

- The observer's eye point (or *from point*) is the point in model space from which the view is being observed. It may be anywhere outside or inside the physical design model.
- The model's *through point* (or *to point* or *centre of interest*) is the point in model space which coincides with the centre of the display area.

- The *line of sight*, which is the line through the eye point and the through point, is the axis along which the view is looking.
- The *angle of view* is the angle subtended at the eye point by the vertical side of the display area.

When the view is to be changed, the view geometry may be specified in the following ways:

- The *eye point* is specified by its 3D coordinates in the model's axis system. The eye point may also be derived from a specified through point and line of sight, but this is much less common.
- The *through point* may either be specified by its 3D coordinates in the model's axis system or it may be derived from a specified line of sight.
- The *line of sight* may either be specified as a direction (expressed as bearing plus elevation components) from the eye point or it may be derived from a specified through point.
- The *angle of view* may either be specified directly as an angle or it may be derived from a specified display area.

You can manipulate the view in the following ways:

- *Rotation* of the view may take place either about the observer's eye point or about the model's through point.
- *Roll* of the view corresponds to rotation of the view pyramid about the line of sight.
- *Zooming* of the view corresponds to movement of the observer's eye point backwards or forwards along the line of sight, thus changing the distance between the eye point and the model, with the angle of view kept constant. This changes the amount of the model which fits into the effective display area without changing the perspective angle.
- *Field of view* changes correspond to a narrowing or widening of the view angle with the distance between the through point and the eye point kept constant. This changes the amount of the model which fits into the effective display area by changing the perspective angle (like changing the focal length of a camera lens).

Review allows you to define eight different views at any one time, identified by reference to an *observer* or to any of seven numbered *cameras*.

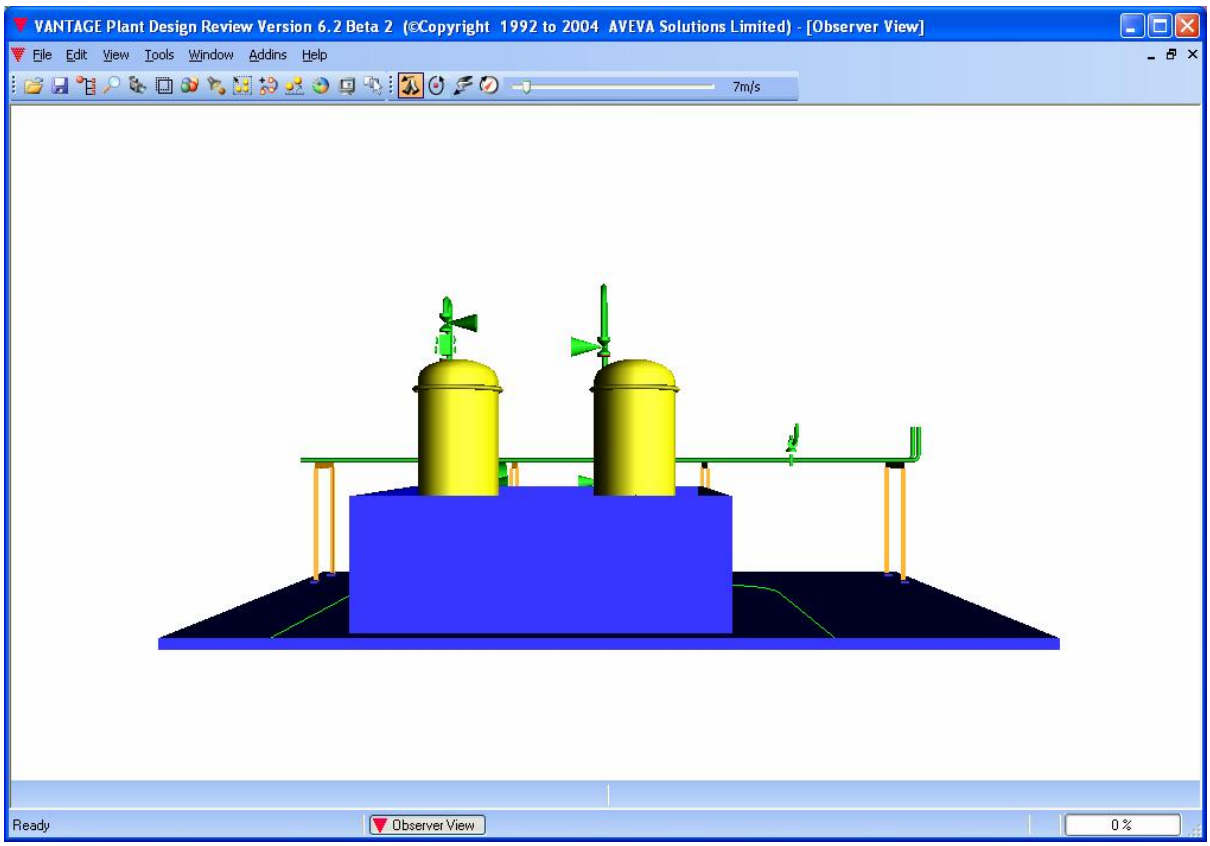
- The **Observer View** offers the maximum scope for customisation and manipulation of the view, and it is this view which you will use for most complex operations such as measurement and labelling.
- The *camera views* offer a more limited range of viewing options, restricted primarily to differences of viewpoint, but you can switch quickly between them without having to redefine the view pyramid parameters each time.

By default, the view you see displayed is set up for the observer.

For details of how the Camera View options are used, refer to the corresponding descriptions for the **Observer View** throughout this guide.

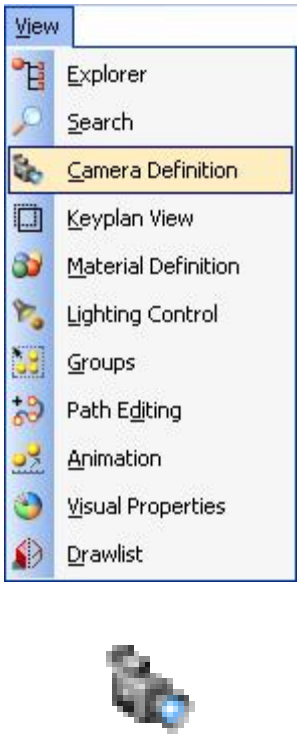
4 The View Panels

Having entered Review and loaded a model file (see Section 2), a typical main Review window would appear as shown below:


VANTAGE Plant Design Review Version 6.2 Beta 2 (©Copyright 1992 to 2004 AVEVA Solutions Limited) - [Observer View]
File Edit View Tools Window Addins Help
7m/s
Ready
Observer View
0 %

A set of *view panels* may be displayed within the main window, being accessed from the **View** pull-down menu. The picture at the start of Section 1 shows a main window with three panes.

4.1 Controlling the View



The **Camera Control** form allows you to define the view by entering explicit positions and directions or by manipulating the line of sight interactively. Any changes made are immediately visible within the **Observer View**.

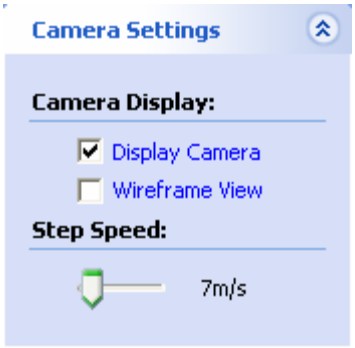
The **Camera Setting For** option allows you to define view settings for the *Observer* or for any of seven cameras. Make the appropriate selection from the pull-down menu or use the wheel on your mouse (if present) to scroll through the menu.

The **Current Mode** option allows you to select the current viewing mode (see Section 5.1 for details of each of the modes).

Notice how the **Camera Settings** panel expands appropriately according to the camera setting/viewing mode selected.

4.1.1 The Camera Settings Panel

The **Camera Settings** panel looks like this:



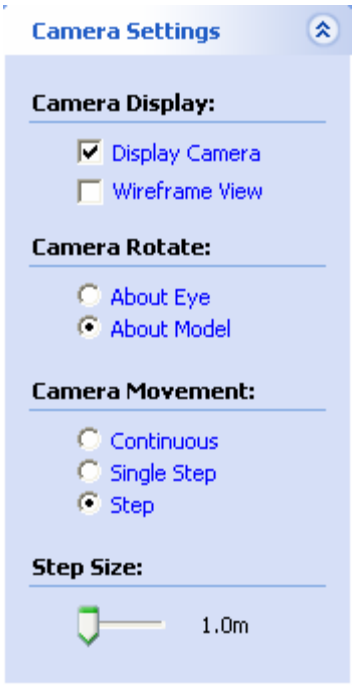
This panel enables you to change the settings for the selected camera. *Walkthrough*, *Flythrough* and *Fixed Focus* display navigation modes share the same settings. *Classic* navigation mode has some extra settings.

The appearance of the panel for *Walkthrough*, *Flythrough* and *Fixed Focus* modes can be seen above.

Display Camera, when selected, gives a colour-shaded **Observer View**. **Wireframe View** gives a wireframe **Observer View**.

The **Step Speed** slider allows you to set the speed for step movements in the view such as from panning or the **W**,**S**,**A** and **D** keys.

When in **Classic** navigation mode, the following settings are available:



About Eye sets the camera to rotate about the eye; **About Model** sets the camera to rotate about the model.

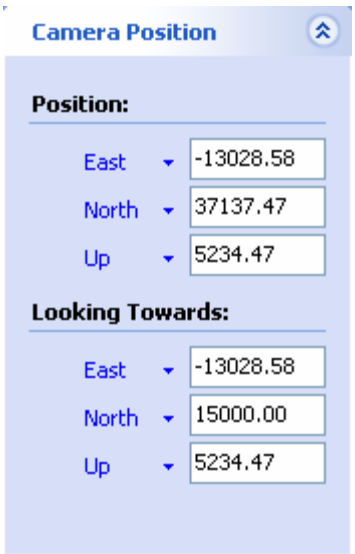
The **Camera Movement** options are as follows: **Continuous** sets Continuous mode for mouse-controlled rotates and zooms (the view changes continuously for as long as you hold down the mouse button); **Single Step** sets Single Step mode for mouse-controlled rotates and zooms (the view changes only when you release the mouse button); and **Step** sets Step mode for mouse-controlled rotates and zooms (the view changes continuously for as long as you hold down the mouse button).

*Conti*S*uous* mode and S*tep* mode are very similar; see Section A.1.1 (*Secondary Manipulation Mode*) for more detail on the above options.

The **Step Size** slider sets the speed for step size movements such as zoom and pan.

4.1.2 The Camera Position Panel

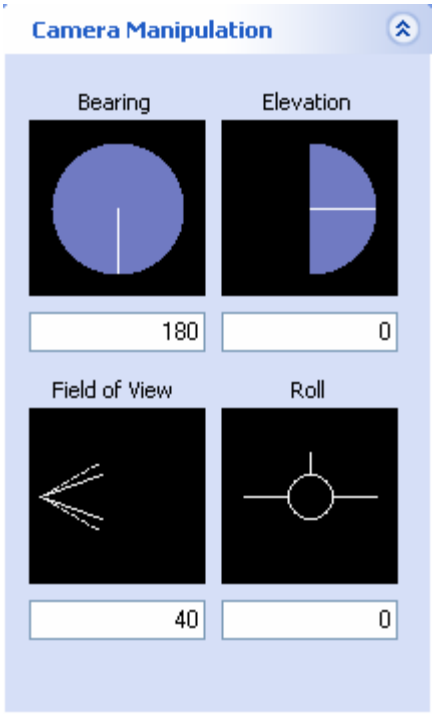
The **Camera Position** panel looks like this:



This panel enables you to set the position of the camera and the through point. Enter the required values in the text boxes and press **Enter** to observe the effect on the display. Clicking on **East**, **North**, **Up** changes them to **West**, **South**, **Down** respectively.

4.1.3 The Camera Manipulation Panel

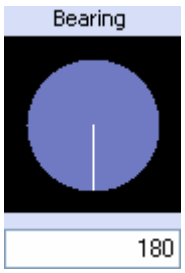
The **Camera Manipulation** panel looks like this:



This panel enables you to set the camera orientation and field of view.

The Bearing Control

This is shown as a 'compass dial' with North (not marked) at the top:



The current horizontal bearing is shown by the position of the radial line (the 'compass needle'), and in figures (degrees). The view direction is from the centre of the dial looking outwards along the line.

To change the bearing, drag the compass needle round to the required setting with the left-hand mouse button held down. Release the mouse button to fix the direction.

The Elevation Control

This is shown as a semi-circular dial:

The current vertical elevation is shown by the position of the radial line, and in figures (degrees). The view direction is from the centre of the dial looking outwards along the line.

To change the elevation, drag the radial line round to the required setting with the left-hand mouse button held down. Release the mouse button to fix the direction.

The Field of View Control

This is shown as an included angle:

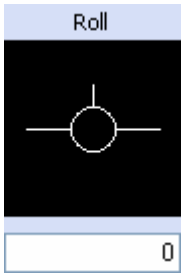
The current angle of view is shown by the angle between the solid lines and in figures (degrees). This angle is that subtended at the eye point by the vertical side of the displayed area of the model. (The angle between the dotted lines approximates to the natural viewing angle of the human eye.)

To change the angle of view, and hence the field of view, drag the lines closer together or further apart with the left-hand mouse button held down. Release the mouse button to fix the angle.

> **Note:** Reducing the angle of view effectively magnifies the display (like increasing the focal length of a camera lens while keeping the camera-to-subject distance constant). This is not the same as moving the observer closer to the model, since the latter keeps the angle of view constant. The difference is illustrated, in a slightly different context, in Section 3.1.

The Roll Control

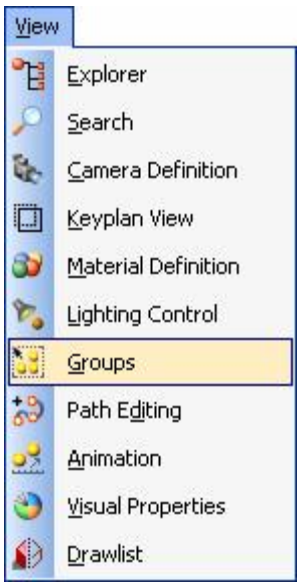
This is shown as a cross-Section of a schematic aircraft:



The current angle of roll in the vertical plane is shown by the angle of the aeroplane's tail fin (0 = tail fin at the top, as illustrated), and in figures (degrees).

To change the angle of roll, drag the aeroplane's tail fin round to the required setting with the left-hand mouse button held down. Release the mouse button to fix the direction.

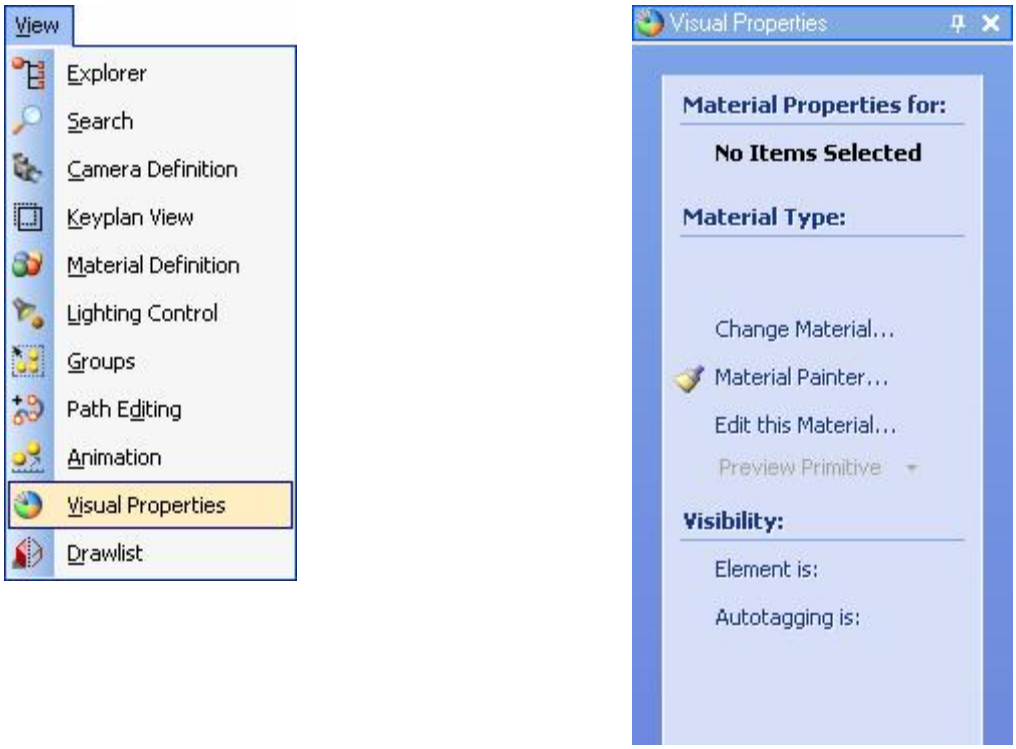
4.2 Grouping Displayed Elements



The **Groups** form allows you to link displayed elements together into logical *groups*, so that you can then manipulate them collectively.

Working with groups is fully described in Section 12.

4.3 Setting Visual Properties



(In the illustration above right, an item has been selected in the **Observer View**.)

The **Visual Properties** form allows you to view or change the material properties of a selected element. Any changes made on the **Visual Properties** form will be immediately shown in the **Observer View**. Single or multiple selections made in the currently active window will be tracked and, where possible, the properties for those elements will be displayed.

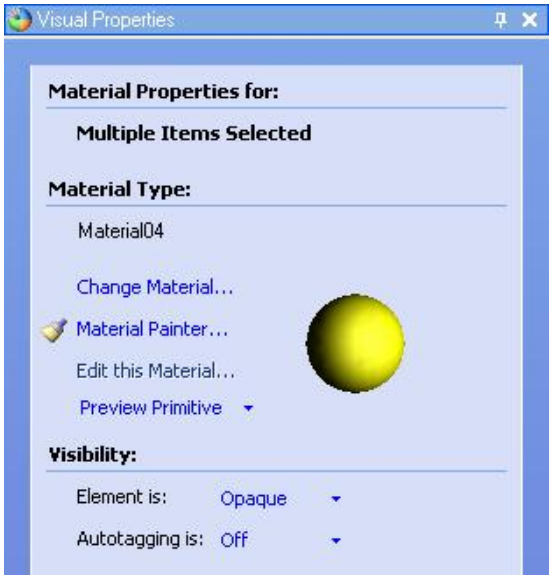
4.3.1 Tracking Selected Elements

The **Visual Properties** form will show the properties for elements selected in the currently active window. Windows tracked by the panel are the **Explorer**, the **Observer View** and the **Search results** list (see Section 4.4.3)

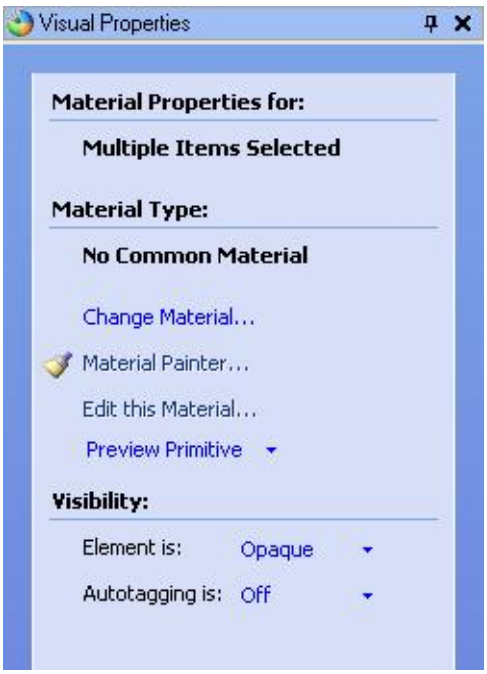
Some of these windows allow for multiple selections. When a multiple selection is active and all the elements in the selection have the same value for one of the properties then that value will be displayed in the window. Where there is a multiple selection with differing properties then the **Visual Properties** will be shown as mixed and you will be allowed to set the selection.

For example:

Multiple selections with common visual properties:



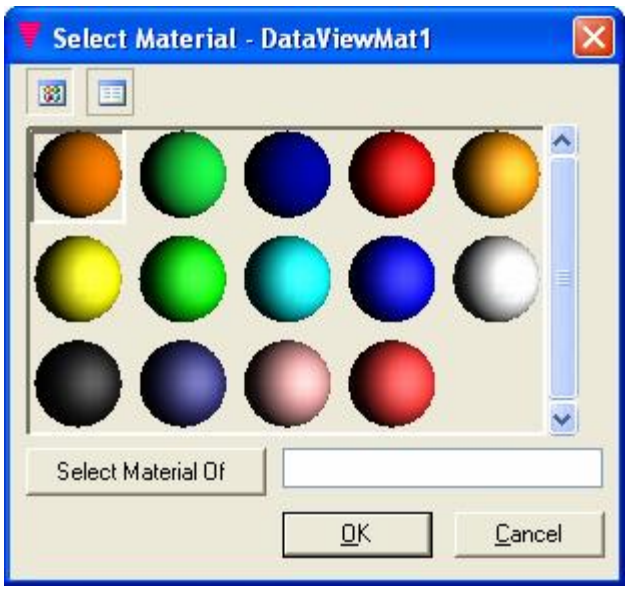
Multiple selections with non-matching visual properties



4.3.2 Setting Visual Properties

If the **Material Type** is the same for all elements in the selection then the material name will be shown on the form along with a primitive rendered with that material type (as shown in the diagrams above). If the material type is not the same for all elements in the selection then the form will show the text "No Common Material" and there will be no preview primitive shown.

To change the material of the entire selection click on **Change Material…** This brings up the **Change Material** form as shown below.



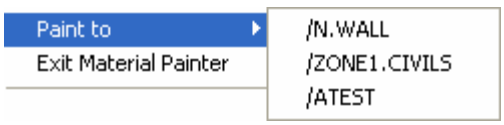
See Section 8.3 for more details of this form.

Click on the required material to select it or type in the name of an element to select the material of that element, and then click **Apply**.

4.3.3 Applying a Material

The **Material Painter** provides a way to apply the material of the currently selected item to other elements. Clicking on **Material Painter…** will change the pointer to a 'paintbrush' (), able to paint elements in the **Observer View** with the current material.

To apply the material to an owner of the selected element, use the mouse to bring up the shortcut menu on element. This displays a list of owners for the item under the mouse to paint to. See below for an example:

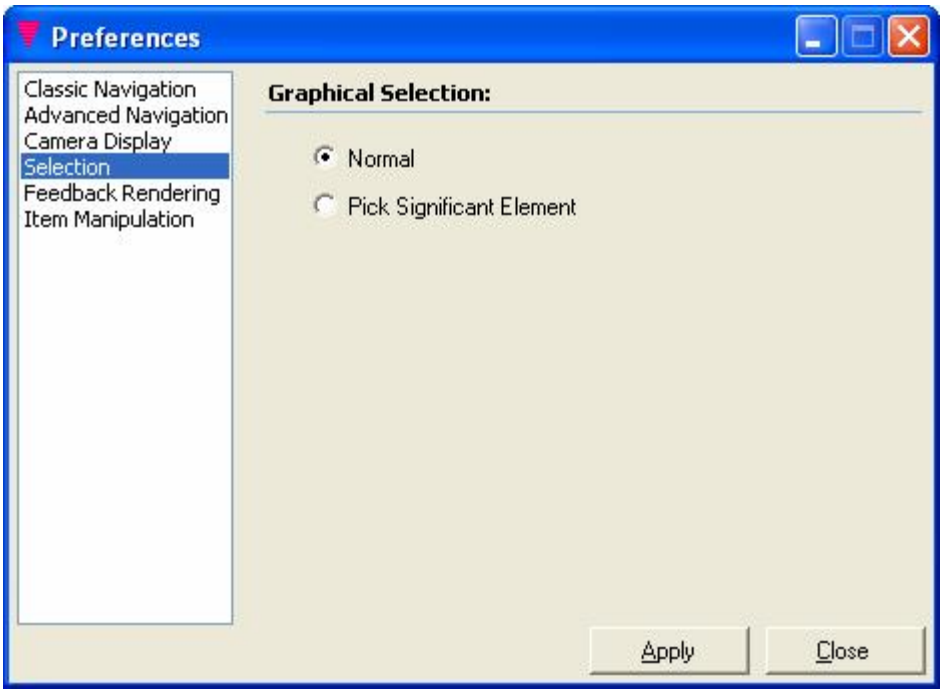


The material will be painted to the element under the mouse when the mouse button is released. On mouse down the item will be highlighted. Moving the mouse around while the mouse button is down will change the item to be painted to the item under the mouse. This is particularly useful if you missed the item to be painted when the mouse button was pressed. Moving the mouse with the button still down will allow for the correct item to be painted.

The pointer remains as a paintbrush until **Esc** is pressed, **Material Painter…** is selected again or **Cancel Format Painter** is selected from the shortcut menu.

Note: The **Material Painter** useshe setting of the **Graphical Selection: preferenc**e on the **Preferences** form (**Tools>Options>Preferences…**) to determine which element to paint to when the mouse is clicked.

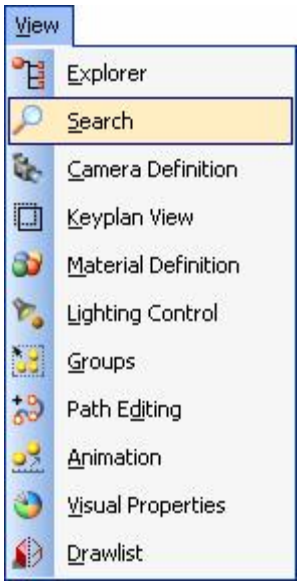
For example with this preference set to Normal clicking on box BOX1 of /EQUI1 will paint the material to the box. When this preference is set to Pick Significant Element clicking on this box paints the material to equipment EQUI1.



4.3.4 Selecting a Preview Primitive

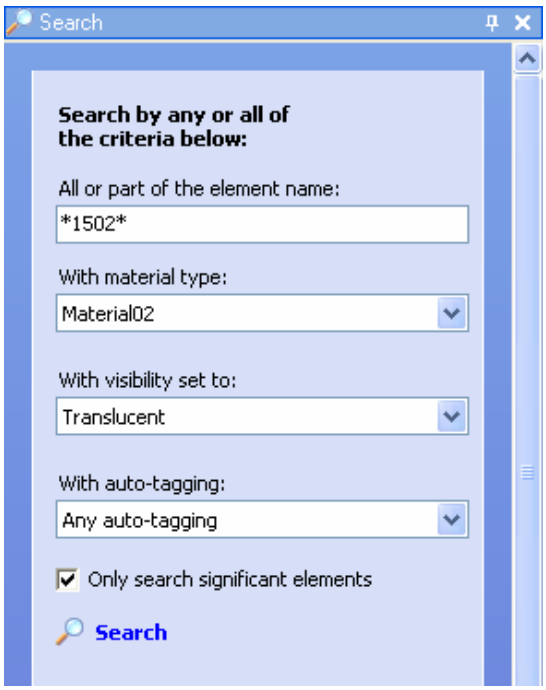
You can change the primitive shape used to preview the current material. Clicking on **Preview Primitive…** cycles through sphere, cube, circular pyramid and hemisphere shapes.

4.4 Searching the Model



The **Search** form enables you to search for an element name within the model files currently loaded into Review. Searches can be run against part of the element name by using wildcards. The search can be further refined by searching on the element's material type, visibility and auto-tagging setting.

For example, with the settings shown below, when **Search** is clicked the search is run to find all elements with '1502' anywhere in their name *and* a material type set to 'Material02' *and* that are translucent.



4.4.1 Searching on Element Names

The search can be run against all or part of the element name, which may include wildcards. Two wildcard characters are available; the asterisk (*) and the question mark (?).

The * wildcard will match 0 or many characters to the * in the search; for example EQUI*101 would return results such as EQUIPMENT-101, EQUI101 and EQUI-101.

The ? wildcard character will match any character to the one character represented by the wildcard. For example EQUI?101 would return EQUI-101 as a result but not EQUIPMENT-101 or EQUI101.

If no wildcard characters are used then Review searches for *any* name containing the supplied text at *any* point in the name. This is the equivalent of a * wildcard at both the beginning and end of the search text. For example, entering EQUI in the name field would find any name with the text EQUI anywhere in the name.

If no text is entered the search will be governed by the settings of the material type/visibility/auto-tagging criteria.

To search only elements that have 'significant' names select **Only search significant elements**. Significant element names come from the text to the right of the first '/' in (full) element name. For example in BOX 1 OF /VESS1, /VESS1 is the significant name.

4.4.2 Searching on Display Properties

It is also possible to further refine the search by searching on the display properties of the elements.

The **With material type:** list allows you to choose a material to search on. Selecting a material from this list will further refine the search by only searching for elements with that material type. Any material searches for an element regardless of material type.

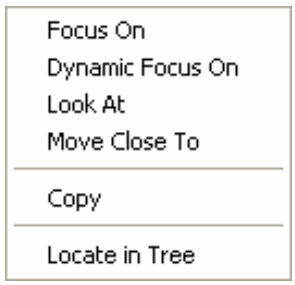
The **With visibility set to:** list allows you to choose a visibility setting to search on. Selecting a visibility setting from this list will further refine the search by only searching for elements with that visibility setting. Any visibility searches for an element regardless of material type.

The **With auto-tagging:** list allows you to choose an auto-tagging setting to search on. Selecting an auto-tagging setting from this list will further refine the search by only searching for elements with that auto-tagging setting. Any auto-tagging searches for an element regardless of material type.

See Section 11.2 for details of auto-tagging.

4.4.3 Search Results

The results of the search will be displayed in the **Search results** list at the bottom of the form. It is possible to select elements on this list and act on them using the following shortcut menu:



Menu Option	Function
Focus On	The observer *walks in* to the object under the pointer until the object fits in the extent of the view. Same as **Dynamic Focus On**, but with no animated movement.
Dynamic Focus On	The observer *walks in* to the object under the pointer until the object fits in the extent of the view. Gives an animated movement of the camera from the start position to the end position.

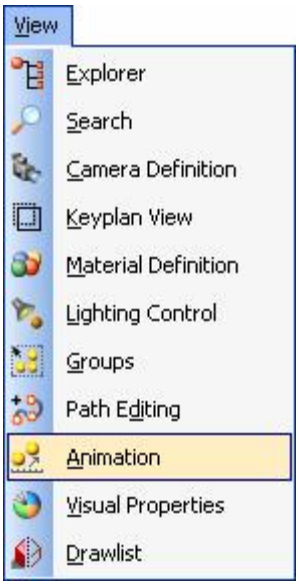
Menu Option	Function
Look At	Re-orients the camera to look towards the identified element, but with no movement of the camera
Move Close To	Moves the camera a short distance away from the identified element. Unlike the **Focus On** operations, this operation does not attempt to fit the item into the **Observer View**.
Copy	Captures the associated element name, which can then be used when defining *look towards* views, *clip volumes*, *groups* etc. See later in this User Guide.
Locate in Tree	Highlights the item in the **Explorer** window. If the **Explorer** window is not present, this operation brings it up.

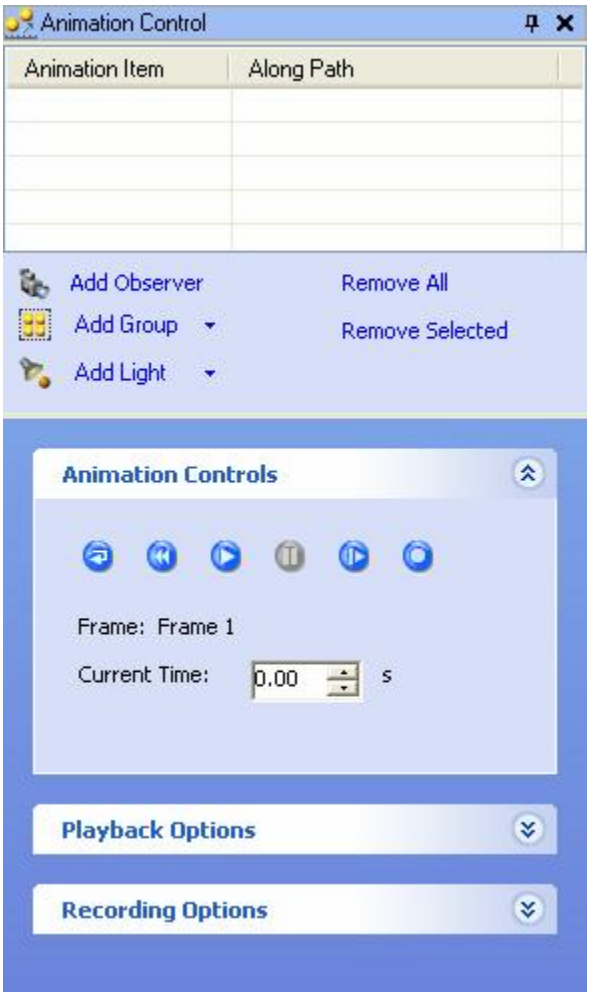
Multiple selections can be made from the list using the normal Windows **Shift**, **Control** selection features. For multiple selections in the list only **Copy** will be available on the menu.

The **Visual Properties** form (see Section 4.1) shows the visual properties for elements selected in the **Search results** list.

4.5 Defining an Animation

The **Animation Control** form allows you to define and play back an *animation* by setting up a progressive sequence of views. An animation requires an *animation path* to be defined first – see Section 4.6.

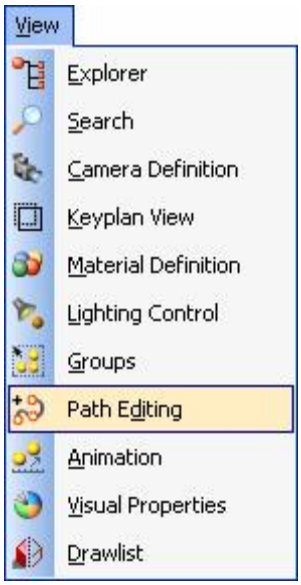




See Section 13 for a full description of setting up and playing animations.

4.6 Creating and Editing Animation Paths

The **Path Editing** form allows you to define and an *animation path*, objects such as cameras, groups or lights can then be animated along the paths. – see Section 4.5.



See Section 13 for a full description of setting up and playing animations.

4.7 Manipulating the View Panels

The **View Panels** themselves incorporate standard Windows manipulation features:

Clicking the **Close** button ( ) at the top right-hand corner will remove the view pane. Clicking the **Auto Hide** ( ) button will cause the panel to disappear whenever the pointer is moved into the graphical view.

For example, for the **Explorer**, moving the pointer over the button at top left

would cause the **Explorer** to reappear.

5 Manipulating the Observer View

This Section describes the principal ways of manipulating the graphical view of the model displayed in the **Observer View** window. These are:

- By using the *mouse buttons*, where the observed effect is governed by the position of the pointer within the screen area.
- By using the *keyboard*, where the arrow keys and numeric keypad keys change the view in specific ways.
- From within the *view definition* forms. These allow you to enter explicit instructions for setting the required view or to manipulate the view by using controls on the forms.
- By selecting an option from the **Edit>Look** submenu option
- By constraining movement to a sequence of fixed directions by setting a specific walk path.

Note: Some of the menu bar options presented in this Section will only be visible if the **Observer View** is made active (by clicking in it).

5.1 The Navigation Toolbar

The **Navigation** toolbar looks like this:

The **Navigation** toolbar controls the way in which the view manipulation features of Review work. Most navigation operations can be performed using the mouse or keyboard, as detailed below.

The four buttons on the left select Walkthrough mode, Fixed Focus mode, Flythrough mode and Classic mode (see below).

Walkthrough mode — For use with *walkthroughs*. All movement is relative to the observer, who can only move in the horizontal plane. See Section 5.1.2

	Fixed Focus mode	Used to fix the *focus point*. All movement is relative to the pointer position. The user can rotate around the focus point and move closer and further from it. See Section 5.1.6). Fixed focus mode is best used in conjunction with the shortcut menu. See Section 5.2) for quick snapping to elements.
	Flythrough mode	Similar to walkthrough mode, except that movement of the observer is not restricted to the horizontal plane.
	Classic mode	View manipulation operates as it did with Review version 6.1 or earlier. See Appendix A for details.
	slider	Controls the speed at which *zoom* and walkthrough operations take place. Move the slider control to the right to increase the speed. The speed is displayed to the right of the slider control.

5.1.1 Common Mouse Operations

(**Click**) In all modes, clicking the right-hand mouse button with the pointer over an object causes the *shortcut menu* to appear. See Section 5.2.

(**Drag**) In all modes, pressing and holding down the left-hand mouse button causes the name and model coordinates of the element under the pointer to appear in the status line.

5.1.2 Walkthrough/Flythrough Mode – Mouse Operations

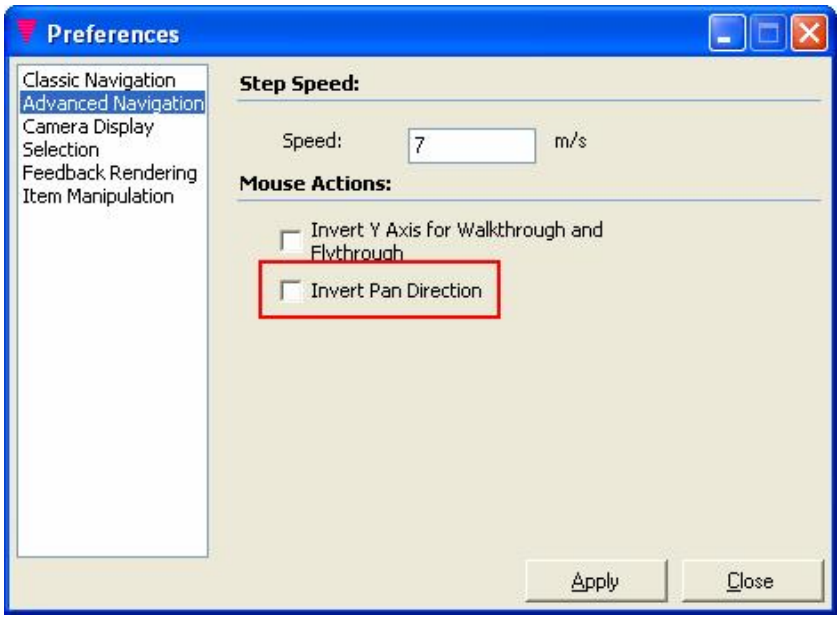
(**Click**) The view centres on the object under the pointer.

(**Drag**) The model is rotated about the observer.

The observer *walks forward* and backwards along his line of sight.

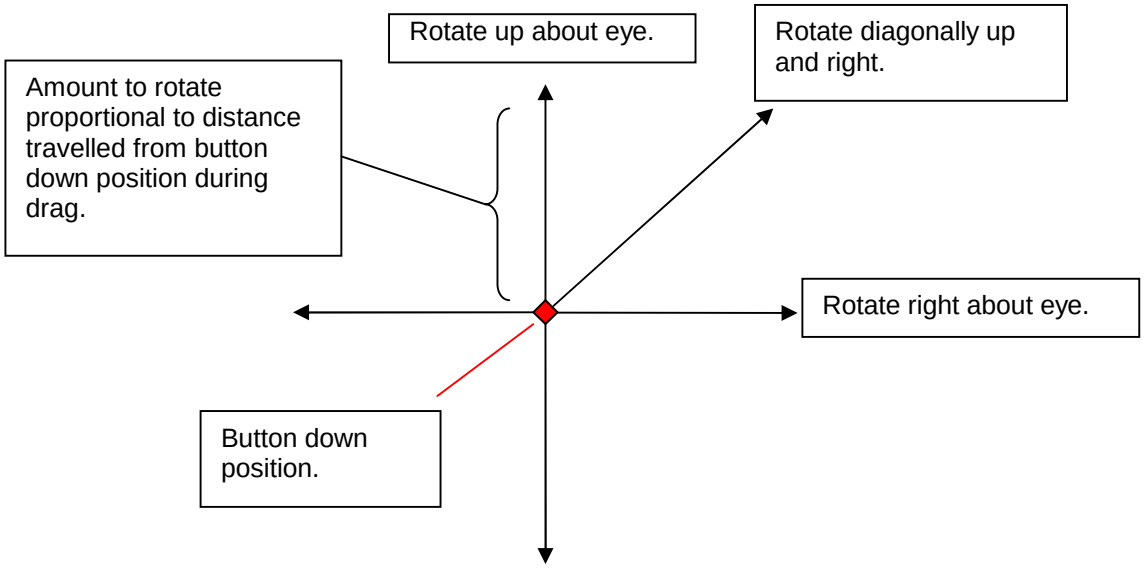
(**Drag**) The observer *pans* in the direction of pointer movement, the camera view changes accordingly. The amount the camera is panned is proportional to the distance moved by the mouse from the *button-down* position during the drag.

An option on the **Preferences** form (**Tools>Options>Preferences**) enables the pan directions to be inverted:

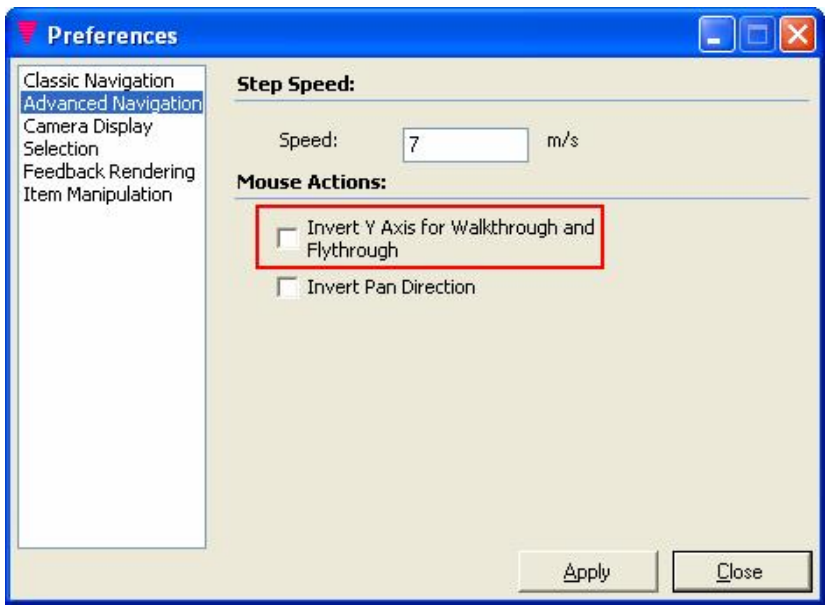


5.1.3 Walkthrough/Flythrough Mode – More on Rotating using the Mouse

Walkthrough mode enables rotation about the eye point. The amount to rotate the camera is defined by the distance travelled by the mouse during the drag operation. The camera rotates in the direction the mouse travels. Diagonal drags result in a compound rotation about the two axes (e.g. up and right).

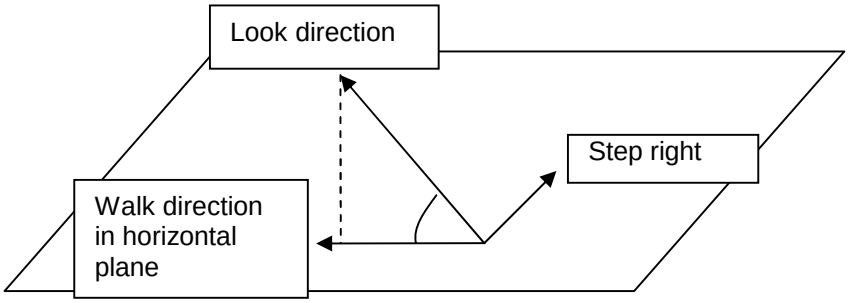

Rotate up about eye.
Rotate diagonally up and right.
Amount to rotate proportional to distance travelled from button down position during drag.
Rotate right about eye.
Button down position.

Note: An option on the **Preferences** form (**Tools>Options>Preferences**) enables the axis direction for up/down rotations to be inverted:



5.1.4 Walkthrough Mode – More on Walking

Walking forwards and backwards in Walkthrough mode is constrained to the horizontal plane, giving an intuitive way of navigating around the model. The direction to move is taken from the direction of the camera transposed onto the horizontal plane.



5.1.5 Walkthrough/Flythrough Mode – Keyboard Operations

Key	Navigation Action
W	Walk forwards
S	Walk backwards
A	Step left
D	Step right
R	Step up
F	Step down
↑	Pan up
↓	Pan down
←	Pan left
→	Pan right
Numpad 2	Rotate down about eye
Numpad 8	Rotate up about eye

Key	Navigation Action
Numpad 4	Rotate right about eye
Numpad 6	Rotate left about eye
Numpad 5	Walk forwards
Numpad 9	Walk forwards
Numpad 3	Walk backwards
⇧	Slow down movement
Ctrl	Speed up movement

5.1.6 Fixed Focus Mode – Mouse Operations

(**Click**) Centres the view on the pointer position

(**Drag**) The model is rotated about the pointer position.

The observer moves closer to/further away from the model, along his line of sight.

(**Drag**) The observer *walks* in the direction of pointer movement, the camera view changes accordingly. The amount the camera is panned is proportional to the distance moved by the mouse from the *button-down* position during the drag.

An option on the **Preferences** form enables the pan directions to be inverted. (See Section 5.1.2.)

5.1.7 Fixed Focus Mode – Keyboard Operations

Key	Navigation Action
W	Move closer to focus
S	Move away from focus
A	Step left
D	Step right
R	Step up
F	Step down
	Pan up
	Pan down
	Pan left
	Pan right
Numpad 8	Rotate up about model
Numpad 2	Rotate down about model
Numpad 4	Rotate right about model
Numpad 6	Rotate left about model
Numpad 5	Move closer to focus
Numpad 9	Move closer to focus
Numpad 3	Move away from focus
	Slow down movement
Ctrl	Speed up movement

5.1.8 Fixed Focus Mode – More about Rotation

Rotates in Fixed Focus mode work in a similar way to rotates in Walkthrough mode, except that unlike in Walkthrough mode there are no diagonal rotations. The size of the angle of rotation is proportional to the amount the mouse moves with the middle button pressed.

In Fixed Focus mode movements left and right with the mouse affect the bearing and movements up and down will affect the elevation. The direction of rotation is determined by the initial direction of the mouse drag. For those familiar with PDMS, rotations in Fixed Focus mode work in the same way as rotations in PDMS.

5.2 Direct Manipulation Using the Shortcut Menu[1]

A number of options for moving the observer are available from the shortcut menu (the right-hand mouse button menu) with the pointer over an object in the **Observer View**. In all operations the observer's looking direction remains unchanged.

Menu Option	Function
Stand on Surface	Moves the camera to a fixed height (the height of an average person) above the pointer position.
Focus On	Moves the camera to the selected element and looks at it.
Dynamic Focus On	Moves the camera to the selected element, with dynamic movement, and looks at it. The dynamic movement will animate the camera from the start position to the end position.

[1] There are additional shortcut menu options in Classic mode, see Appendix A.

Menu Option	Function
Look At	Re-orientates the camera to look towards the identified element, but with no movement of the camera
Move Close To	Moves the camera a short distance away from the identified element. Unlike the **Focus On** operations, this operation does not attempt to fit the item into the **Observer View**.
Locate in Tree	Highlights the item in the **Explorer** window. (If the **Explorer** window is not present, this operation will bring it up).
Copy	Captures the associated element name, which can then be used when defining 'look towards' views, clip volumes, groups etc. See later in this User Guide.
Select	Gives a submenu enabling the significant elements above the selected element in the hierarchy to be selected. A **Clear Selection** option also becomes available if there is a graphical selection
Cancel	Cancels the menu and performs no action

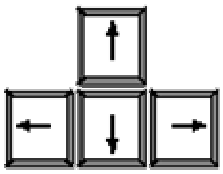
Note that the **Focus On**, **Dynamic Focus On** and **Look At** shortcut menu options are also available from the **Explorer** view – see Section 2.2.

5.3 Direct Manipulation Using the Keyboard - General

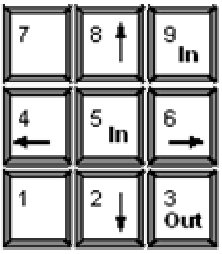
You can change the observed view by pressing specific keys on your keyboard. The precise effect depends mainly on the following things:

- The *type* of change (*Zoom*, *Rotate* or *Pan*) depends on which key you press.
- The *extent* of the change depends on the current *increment settings* for displacement and rotational movements.

The effects of the individual keys are as shown in the following diagram:



Arrow keys pan in directions shown



Numeric Keypad keys 2,4,6,8 **rotate in directions shown.** Keys 5,9 zoom in; key 3 zooms out.

All movements initiated by key presses are independent of the pointer position within the graphical view and always give Step mode changes; that is, each key press moves the view by a full increment (unless reduced by a factor of 10 by holding down the ⇧ (shift) key, or increased by a factor of 10 by holding down the **Ctrl** key). If you hold down a key, the view is redrawn at the screen's redraw rate until the key is released.

The following constraints apply:

- If **Num Lock** is on then numeric keypad keys **4** and **6** rotate the model about the observer in Walkthrough mode, or rotate the model about its centre in Fixed Focus mode.

Exercise:

Set Step mode and observe the effect of pressing each of the model-manipulation keys in turn.

Try holding down first the ⇧ (**shift**) key and then the **Ctrl** key while pressing each of the model-manipulation keys and note the change in the rate of movement of the view in each case.

Try pressing different pairs of keys simultaneously to produce composite movements; for example, **pan + zoom**, **rotate + zoom**, pan + rotate. Press pairs of 'opposite' keys, such as **pan left + pan** right or **zoom in + zoom out**, and note that the effects cancel out to leave the view stationary.

Experiment by using the model-manipulation keys in each of the other modes (Single Step, Continuous and Spin). Change between eye movement and model movement and observe the different effects.

5.4 Other View Manipulation Facilities – all Modes

5.4.1 Spinning the Model

In Spin mode (selected from **Tools>Options>Mode>Spin**) the view rotates continuously, even after you have released the mouse button, until you specifically pause it or stop it.

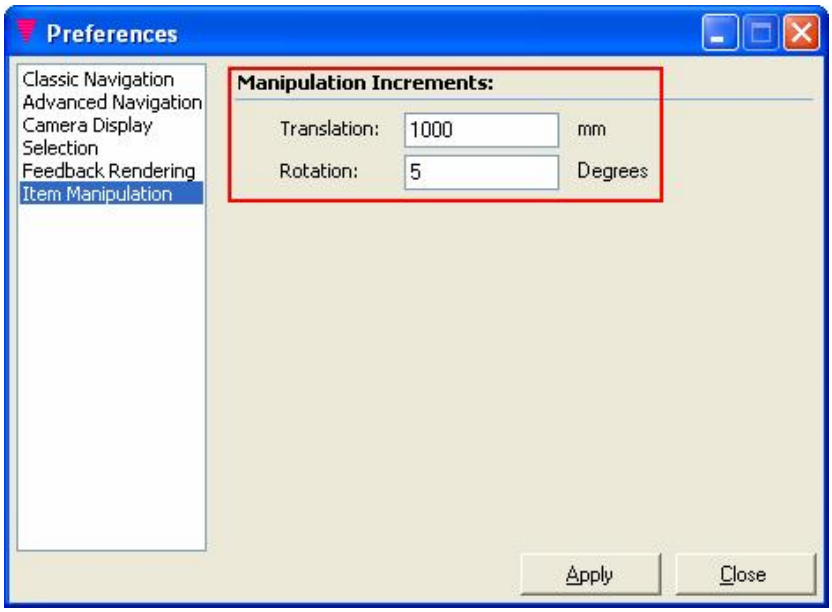
To stop a spinning model, select **Tools>Options>Mode>Spin>Stop**.

To pause a spinning model, press and hold down the right-hand mouse button anywhere in the **Observer View**.

5.4.2 Setting Translational and Rotational Increments

The maximum amount by which the view can change for each zoom, rotate or pan operation is determined by the current translational and rotational increment settings. By default, the translational increment is 1000 mm and the rotational increment is 10 degrees.

To change either or both of the increment settings, select **Tools>Options>Preferences…** from the menu bar. The **Preferences** form shows the current settings, which you can change in the usual way.



5.5 Manipulation Using Menu Options

The **Edit>Look** option with the **Observer View** selected allows you to give explicit instructions, either directly or via resulting forms, for setting the various view parameters. The effects of the associated submenu options are as follows:

5.5.1 Look>From>

These settings enable you to set the eye point to a specific location while retaining the current through point.

Option	Function
Look>From>Camera>	Sets the eye point to that which is currently defined for the observer or a chosen camera number.
Look>From>Name…	Displays the **Look From** form which allows you to specify the name of an element whose origin is to define the new eye point.
Look>From>Group…	Displays a scrollable list within the **Look From Group** form of all currently defined groups, including the scale man. Select the group whose origin is to define the new eye point.
Look>From>Model Centre	Moves the eye point to the geometric centre of the model. (If the through point is at the model centre, the eye point and through point will become coincident and the line of sight will be set to look South.)
Look>From>Model Origin	Moves the eye point to the model's origin.

5.5.2 Look>Towards>

These settings enable you to set the through point to a specific location while retaining the current eye point. This is equivalent to rotating the model about the eye.

Option	Function
Look>Towards>Camera>	Sets the through point to that which is currently defined for the observer or a chosen camera number.

Option	Function
Look>Towards>Name…	Displays a **Look At** form which allows you to specify the name of an element whose origin is to define the new through point. Enter the name of the element in the text box. (Tip: Pick the element in the display using the left-hand mouse button and paste its name into the text box using the middle mouse button.) The list options on the **Look At** form are as follows: **Do Not Move** — changes only the view direction. **Snap Move** — zooms in on the element immediately so that it fills the **Observer View** window. **Dynamic Move** — zooms in on the element by steps until it fills the **Observer View** window. The step size is determined by the current translational increment. A maximum of 15 steps will be taken.
Look>Towards>Group…	Displays a scrollable list within the **Look Towards Group** form of all currently defined *groups* including the scale man. Select the group whose origin is to define the new through point.
Look>Towards>Model Centre	Moves the through point to the geometric centre of the model (which is usually the default setting).
Look>Towards>Model Origin	Moves the through point to the model's origin.

5.5.3 Look>As>

These options reset both the eye point and the through point for the **Observer View** to those which are currently defined for the specified camera view.

Thus **Look>As>Camera Two** changes the **Observer View** so it shows exactly the same view as **the Camera View** for Camera Two. This is a convenient way to store a set of view parameters for later recall.

5.5.4 Look>Window>

Both of the **Look>Window>** submenu options prompt you to define a region of interest by dragging a resizable window to the required position and size within the **Observer View** display. The cross at the centre of the window determines the new through point and the size of the window determines the new angle of view (field of view).

Both options effectively zoom the view in (they cannot be used to zoom out, since the defining window cannot be made larger than the current **Observer View** area).

Option	Function
Look>Window>By Position	Effectively moves the eye point closer to the new through point while keeping the angle of view constant, as shown by the -------- view pyramid in Figure 5-1.
Look>Window>By Angle	Changes the angle of view without moving the eye point, as shown by the ..... view pyramid in Figure 5-1

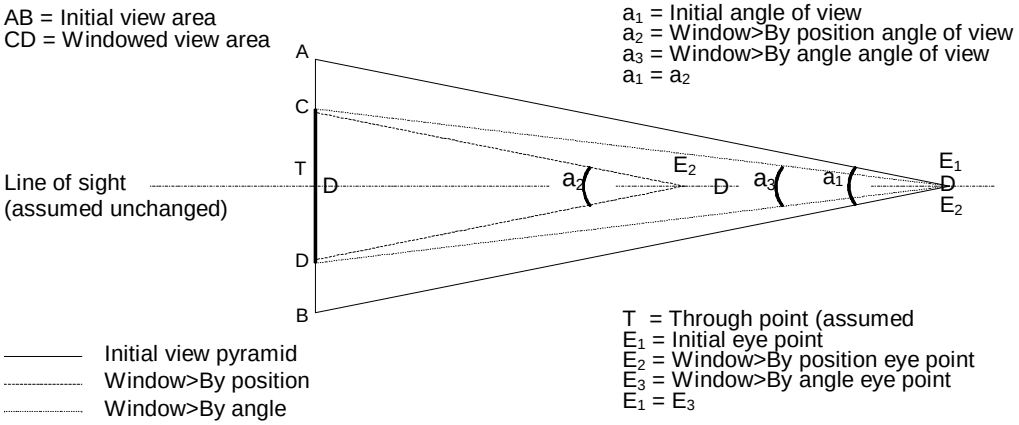


Figure 5-1 The effects of the Look>Window> options (cross-Sections of view pyramids)

5.5.5 Look>Direction>

The effects of the **Look>Direction>** options depend on whether you are currently in Eye or Model rotation mode (as set from the **Camera Definition** form).

If you are in Model rotation mode**, Look>Direction>East** (say) is equivalent to setting the Bearing to East.

If you are in Eye rotation mode, **Look>Direction>East** changes the line of sight so that you look towards East from the current eye point.

5.5.6 Look>ISO>

The effects of the **Look>ISO>** options depend on whether you are currently in Eye or Model rotation mode (as set from the **Camera Definition** form).

These options behave in the same way as the **Look>Direction>** options, except that the view direction is changed to that defined for the specified isometric quadrant. These directions are shown in Figure 5-2.

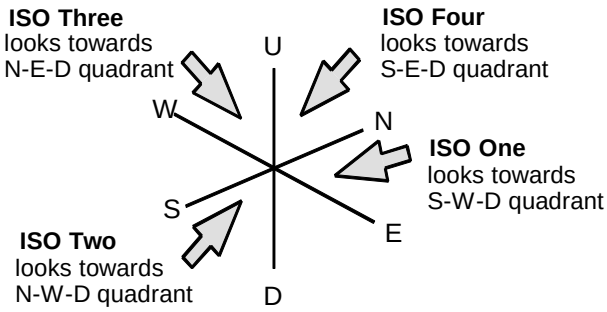


Figure 5-2 The Isometric Viewing Directions

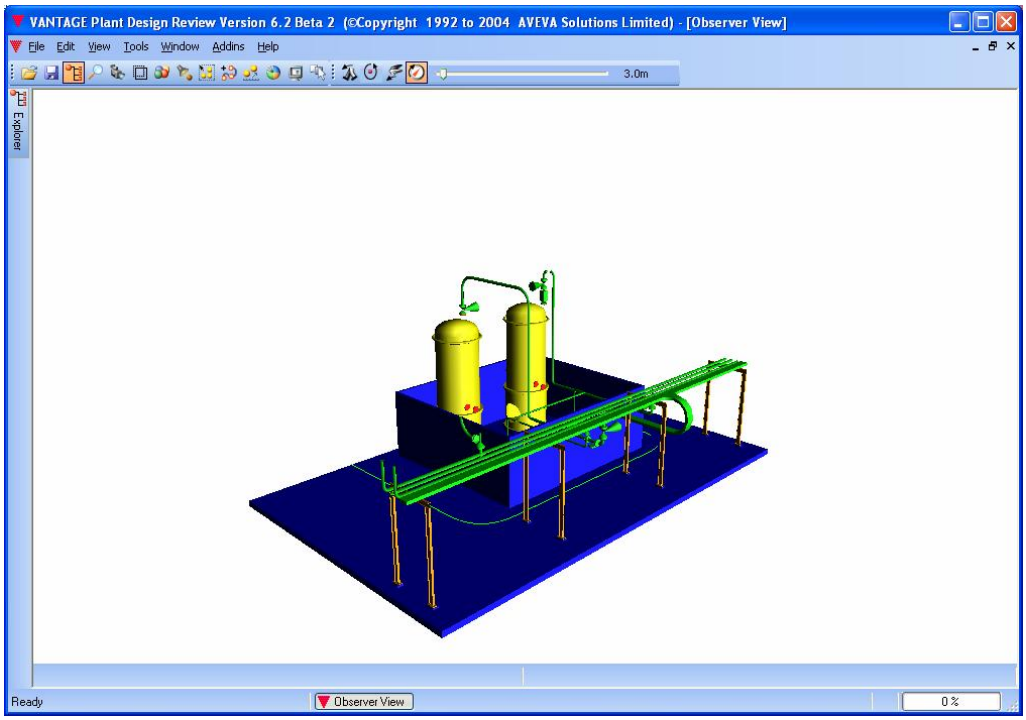

VANTAGE Plant Design Review Version 6.2 Beta 2 (©Copyright 1992 to 2004 AVEVA Solutions Limited) - [Observer View]
File Edit View Tools Window Addins Help
3.0m
Explorer
Ready
Observer View
0 %

Figure 5-3: ISO 3 View

5.5.7 Look>Reset

Look>Reset resets the view to a default display of the whole model. This default view will override that which may have been defined by any previously loaded *status file* (see Section 14 for details about status files).

Exercise:

Try the effects of each of the **Edit>Look** options in turn. (You will probably not yet have defined any groups, but you should be able to use the scale man as a reference for the **Edit>Look>From>Group and Edit>Look>Towards>Group** options for this exercise.)

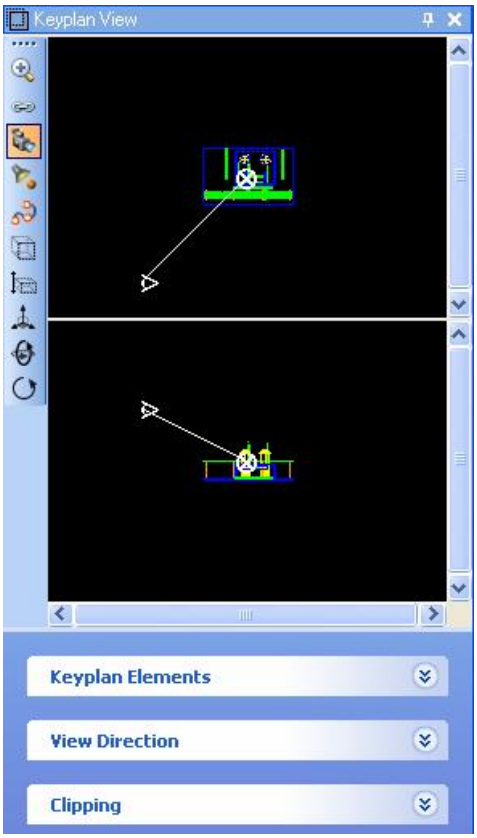
Use **Tools>Options>Observer** to switch between Eye and Model rotation modes where these affect the way in which the **Look** commands behave.

You may find it easiest to see the differences between the effects of the various Look options if you use **Edit>Look>Reset** to return you to a common starting point between each part of the exercise.

6 The Keyplan View

This Section describes how to use the **Keyplan View.** Some of the concepts involved here are described in later Sections; you may wish to refer back to this Section as you encounter them.

The **Keyplan View** is displayed when you click the **Keyplan View** button on the toolbar or when you select **View>Keyplan View** from the menu bar. While you are learning how to use the **Keyplan**, you may want to enlarge the window.



6.1 The Keyplan Control Buttons

The **Keyplan View** window displays small-scale plan and elevation views of the model, and contains a row of toggle buttons down its left-hand side. The settings of these buttons, each of which may be set to **On** (yellow) or **Off** (blue), determine what you see in the Keyplan displays and how the model view will change as the **Keyplan** is manipulated.

The effects of the **Keyplan** control buttons, listed in top-to-bottom order, are as follows:

6.1.1 The Zoom Button

You can toggle the **Keyplan Zoom** button to show or . When the button is set to , moving the pointer into one of the **Keyplan View** windows and clicking the middle mouse button will zoom in. When the button is set to , moving the pointer into one of the **Keyplan View** windows and clicking the middle mouse button will zoom out.

The **Zoom** button is an exception to the On/Off convention: repeated selection of the button toggles its setting between Zoom In and Zoom Out modes.

6.1.2 The Continuously Update Graphics Button

The **Continuously Update Graphics** button, , determines how the **Observer an Camera View** display is updated as you move any of the Keyplan control points (observer's eye point, model through point, etc.).

When the **Continuously Update Graphics** button is selected, the display is updated continuously so that the display immediately follows your manipulations.

When the **Continuously Update Graphics** button is unselected, the display is updated only when you release the mouse button.

The **Continuously Update Graphics** function is used for camera, light and group manipulations.

6.1.3 The Camera Button

When the **Camera** button, , is selected the current active camera position (the eye point), the centre of interest of the model (the through point), and the line connecting them (the line of sight) are drawn on the Keyplan.

To drag the eye point to a new position, position the tip of the pointer at the centre of the eye's surface, thus . To drag the through point to a new position, position the tip of the pointer at the centre of the circle, thus . To pan the line of sight, position the tip of the pointer on the line.

When the **Camera** button is unselected, the viewing positions are not drawn.

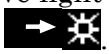
6.1.4 The Light Button

When the **Light** button is selected, the current active light position or direction (according to the type of light) is drawn on the Keyplan so that you can manipulate it.

Different types of light are shown as follows:

Light	Indicator
Infinite Light	
Local Light	

Light	Indicator
Spot Light	

To drag the active light to a new position, position the tip of the pointer at the centre of the circle, thus  .

When the **Lighting** control button is *Off*, the light position is not drawn.

6.1.5 The Path Button

When the **Path** button, , is selected, the current active animation path (if any) is drawn on the Keyplan for reference.

When the **Path** button is unselected, the animation path is not drawn.

See Section 13 for details of setting up animation paths.

6.1.6 The Clip Select Button

When the **Clip Select** button, , is selected, a clip volume marker is drawn on the Keyplan, thus . If this marker is dragged within the Keyplan, any defined clip volumes will be highlighted as the marker passes through them.

To drag the clip volume marker to a new position, drag it with the pointer with the left-hand mouse button held down.

When the **Clip Select** button is unselected, the clip volume marker is not drawn.

> **Note:** The clip volume markers in the plan and elevation views must both be within a clip volume for it to be highlighted

With **Clip Select** selected, releasing the mouse button after manipulating the clip volume marker puts the current clip volume name into the paste buffer, so that you can paste the name into a relevant form by using the middle mouse button. See Section 9.4 for more details of defining clip volume.

6.1.7 The Edit Clip Button

When the **Edit Clip** control button, , is selected, the currently selected clip volume is drawn on the Keyplan. You can edit the size of the clip volume by dragging its sides or corners to the required positions. You can move the whole clip volume, without changing its dimensions, by positioning the pointer at the *centre* of its outline box and dragging it in the required direction (if the clip volume is named, the bottom left-hand point of the name text corresponds to the required centre point).

If there is no current clip volume, you can define one by dragging the outline to the required positions.

When the **Edit Clip** control button is unselected, the clip volume is not drawn.

See Section 9.4.2 for further details of defining a clip volume from the **Keyplan View**.

6.1.8 The Group Origin Button

When the **Group Origin** button, , is selected, the axes of the current active group are drawn. You can move the group's origin by dragging the axes to the required position in either **Keyplan View**. See Section 6.2.1 for more on selecting the active Keyplan group.

To drag the origin of the active group to a new position, position the tip of the pointer at the origin of the displayed axes, thus .

When the **Group Origin** button is unselected, the group position cannot be manipulated from the **Keyplan View**.

6.1.9 The Group Bearing/Elevation Button

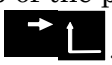
When the **Group Bearing/Elevation** control button, , is selected, you can change the bearing and/or elevation of the current active group by dragging the control points in the appropriate **Keyplan View**. To change the bearing, manipulate the points in the plan view; to change the elevation, manipulate the points in the elevation view.

To drag the bearing or elevation of the active group to a new direction, position the tip of the pointer at the arrowhead on the displayed axes in the relevant view, thus .

When the **Group Bearing/Elevation** control button is *Off*, the group bearing and elevation cannot be manipulated from the **Keyplan View**.

6.1.10 The Group Roll Button

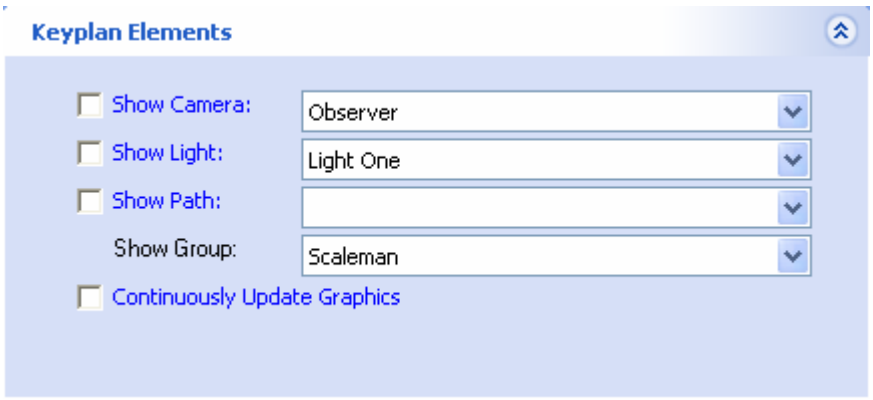
When the **Group Roll** button, , is selected, you can change the angle of roll of the current active group by dragging the control points in either **Keyplan View**.

To drag the active group to a new roll angle, position the tip of the pointer at the arrowhead on the displayed axes in the relevant view, thus  .

When the **Group Roll** button is unselected, the angle of roll of the group cannot be manipulated from the **Keyplan View**.

6.2 Keyplan Control – the Keyplan View Panels

6.2.1 The Keyplan Elements Panel



Option	Function
Show Camera	Performs the same functions as the **Camera** button, see Section 6.1.3. The affected camera can be selected from the option list to the right.
Show Light	Performs the same functions as the **Lighting** button, see Section 6.1.4. The affected light can be selected from the option list to the right.
Show Path	Performs the same functions as the **Path** button, see Section 6.1.5. The required path, and the group to be moved along it, can be selected from the option list to the right.
Continuously Update Graphics	Performs the same functions as the **Continuously Update Graphics** button, see Section 6.1.2.

6.2.2 The View Direction Panel

Clicking on one of the **Look** options changes the **Keyplan View**ing direction as appropriate, Clicking **Reset** will reset the view to its starting setting.

6.2.3 The Clipping Panel

If a clip volume has been defined (see Section 7.6) the options on this panel may be used to display the full or clipped model within the **Keyplan View**.

6.3 Manipulating the Keyplan View Contents

Limited control of the content of the **Keyplan View** is available from the **Edit>Make All** menu, as follows.

Option	Function
Visible	Makes the view contents visible (after they have been made invisible, see below.)
Invisible	Makes the view contents invisible.
Translucent	Makes the view contents translucent (**Observer View** only).

Option	Function
Wireframe	Makes the view contents display in wireframe (**Observer View** only).
AutoTag	Tag displayed items (**Observer View** only).
UnAutoTag	Remove tags from displayed items (**Observer View** only).
Change Materials…	Use **Change Material** (All) form to change material of all displayed items.

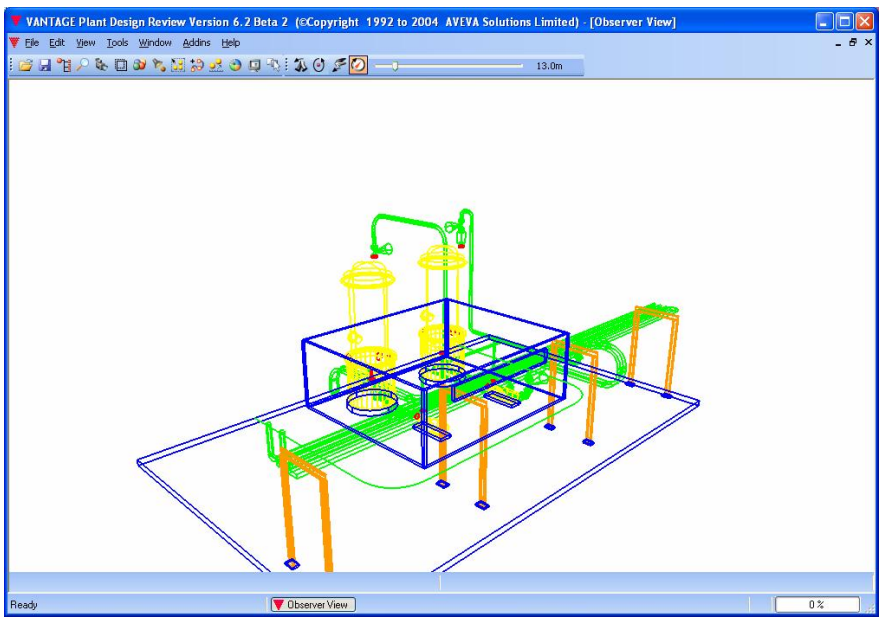
7 Defining Some General View Settings

This Section describes the options which affect the general appearance of the graphical view. These options include:

- Whether the model display is colour-shaded or wireframe.
- Whether the model is drawn at all.
- What colour is used for the background.
- Whether the model atmosphere is clear or foggy, or whether a scenic backdrop is used.
- Autotagging.
- Shadowing.
- Texture mapping.

7.1 Selecting Colour-Shaded or Wireframe Images

Select **Wireframe View** in the **Camera Settings** panel of the **Camera Control** form, Alternatively, select **Edit>Wireframe>** to toggle the display between wireframe and shaded.


VANTAGE Plant Design Review Version 6.2 Beta 2 (©Copyright 1992 to 2004 AVEVA Solutions Limited) - [Observer View]
File Edit View Tools Window Addins Help
13.0m
Ready
Observer View
0 %

7.2 Displaying or Hiding the View

By default, those parts of the model which have been selected for display (by using the add list, clip volume, etc.) are drawn in the **Observer View** window. You can switch off this display temporarily by clearing the **Display Camera** checkbox in the **Camera Settings** panel of the **Camera Control** form.

7.3 Controlling the Image Quality

You can define the display resolution for each type of viewer.

To control one or more aspects of the image quality, select **Edit>Image Quality**. The **Image Quality** form will be displayed. The options on this form are summarised below.

Option	Function
Imaging parameters for	Use this option list to specify the view which you wish to change (observer or a camera), then set the required resolution levels as described in the following subSections.
Static detail level **Dynamic detail level**	Use these option lists to choose the level of detail to be displayed for static and dynamic views. Performance will be improved if a detail level of Low or Medium is selected, especially for dynamic views. You can select two realistic backdrops (in addition to the current background colour) by selecting from the **Camera Backdrop** option list. These backdrops are large but finite: if you zoom out a very long way from the model, you will see the edge of the backdrop.
Horizon Height	This allows you to set the height of the horizon above (or below) the observer's line of sight through the model origin. Only has any effect in backdrop views. The default measurement units in Review are mm, so large values (of the order of 104) need to be entered before any effect will be observed.

7.3.1 Switching Wireframe, Autotagging, Texturing and Shadows

There are option buttons on the **Image Quality** form which control whether the model is displayed as a wireframe or colour-shaded view, and whether autotagging, textures and shadows are shown.

Option	Function
Wireframe	You can set wireframe representation independently for static and dynamic modes by using the **Wireframe** boxes. Note that selecting **Edit>Wireframe** also gives a wireframe display.If you set **Wireframe** for *static* displays, the model will always be displayed as a wireframe model.If you set **Wireframe** for *dynamic* displays, the display changes to wireframe while you are changing the view interactively. This is a faster way of working than maintaining a colour-shaded view while the display is being repeatedly updated. When you release the mouse button, the display changes back to colour-shaded.
Autotagging	Autotags will only be displayed if the **Autotagging** option is switched on. If you switch autotagging off for dynamic views, changing the view will be faster.
Texturing	Textures will only be displayed in the model if the **Texturing** option is switched on. If you switch textures off for dynamic views, changing the view will be faster.
Shadows	Shadows will only be displayed if the **Shadows** option is switched on. If you switch shadows off for dynamic views, changing the view will be faster.

7.4 Adding Fog Effects

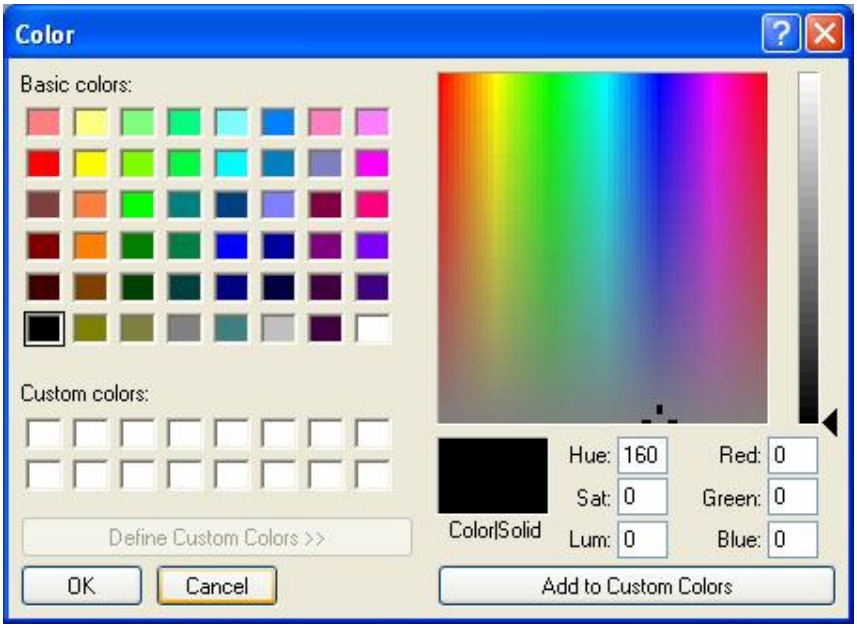
To simulate the appearance of the design model in foggy conditions, select **Edit>Fog>Enabled.** The appearance of the background will change immediately, but you must set the fog parameters as follows before the effect of the fog on the appearance of the model takes effect.

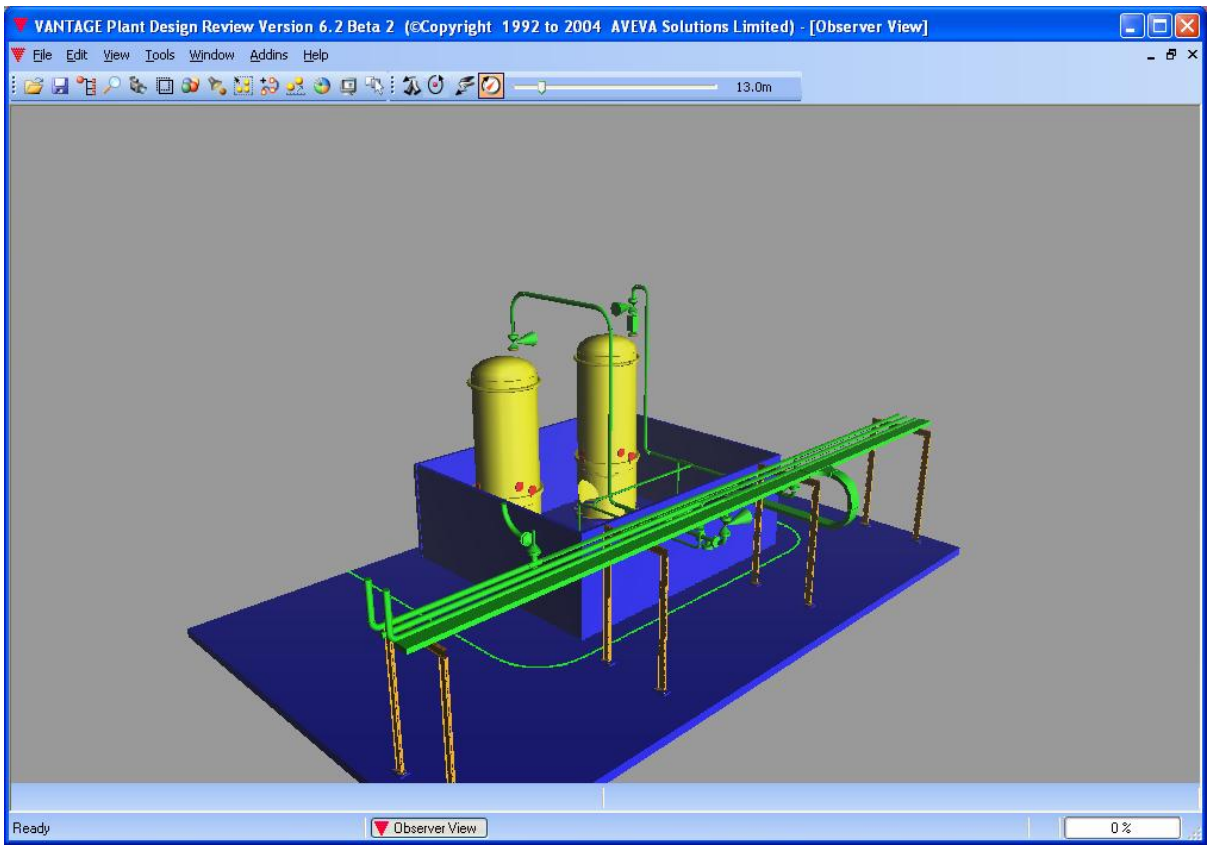
To change the colour and density of the fog, select **Edit>Fog>Fog Colour...**

The **Define Fog Colour (Observer)** form will appear, enabling you to set the density and colour of the fog. A fog density of 0% will not obscure the model display at all, a density of 100% will obscure it completely. The default colour of the fog is grey. To change the fog colour click **Choose… .**

The Windows **Color** dialog box will be displayed. Use the Windows colour chooser to create the required effect. Note that the effect of the fog on the appearance of parts of the model increases with the distance from the observer. The current colour is shown in the sample panel at the right-hand side of the form.

To remove the fog effect from the display, select **Edit>Fog>Enabled** again.




VANTAGE Plant Design Review Version 6.2 Beta 2 (©Copyright 1992 to 2004 AVEVA Solutions Limited) - [Observer View]
File Edit View Tools Window Addins Help
13.0m
Ready
Observer View
0 %

7.5 Setting Background Colours

By default, all background colours are set to black. You can specify a different background colour for each view by selecting **Edit>Background Colour**. A **Define Camera Background Colour** form will be displayed.

Use the **Background colour of** option list to specify the view (observer or a camera), then click **Choose...** and use the Windows colour chooser to define the background colour. Click **OK** to set the chosen colour.

Note that you can select two realistic backdrops by selecting from the **Camera Backdrop** pull-down list on the **Image Quality** form. These backdrops are large but finite: if you zoom out a very long way from the model, you will see the edge of the backdrop.

7.6 Displaying Selected Parts of the Model

The **Import Model Data** form is displayed when you select **File>Open Selection>Model File...** to import a model file to Review. It contains the **Model File Members** list showing the design hierarchy of the model and the **Addlist**, which shows the design elements which will be displayed in the **Observer View** window.

If the model file contains a previously-saved **Addlist**, you will be given the option of using this to define the content of the current **Addlist**.

Use the form as follows:

1. Use the **Browse...** button and select a model file to load members from.
2. Use the **Explorer View** in the **Model File Members** list to select the elements you wish to add to the **Addlist**. Do this by clicking the checkbox adjacent to the required element. Then click **Add** to add the selected elements to the **Addlist**.
3. To remove elements from the **Addlist**, should you make a mistake or change your mind, select the elements in the **Addlist** and click **Remove**. Alternatively, to empty the **Addlist** completely, click **Remove All**.
4. Repeat Steps 1 and 2 until the **Addlist** contains all of the design elements which you wish to display.
5. When the **Addlist** shows all the elements to be displayed, click **OK**. The selected parts of the model will appear in the **Observer View** window.

7.6.1 Using Clip Volumes

You can restrict the display model so that it includes only elements which are wholly inside or outside a predefined 3D box known as a *clip volume*. Defining clip volumes is described in Section 9. If clip volumes have been defined, you can apply them to the model file as it is loaded, so that only those elements which will appear in the clip display are read in. Type the name of the clip volume in the **Clip Against** text box or use the **Select Clip Volume** button to select from a list of available choices before you click the OK button.

7.6.2 Miscellaneous Facilities

Check Names checks for duplicate names in the **Addlist, Report on File** saves a report to file listing duplicate names and other errors.

To save your new **Addlist** select **Save Addlist to File**. The **Addlist** you have created can then be reloaded the next time you use Review.

Exercise:

Add and remove elements of the Atest model to and from the **Addlist**.

Use the **Import Model Data** form to add the whole of the Atest model to the display, with name checking in force, and leave it there for future exercises.

8 Defining Materials

Every element in a model can have a Review *material* applied to it. For each material, you can set a colour and properties such as shininess and smoothness. You can have any number of materials, each with a unique name. You can also apply *textures* to materials to represent, for example, brick walls or grids. See Section 17.

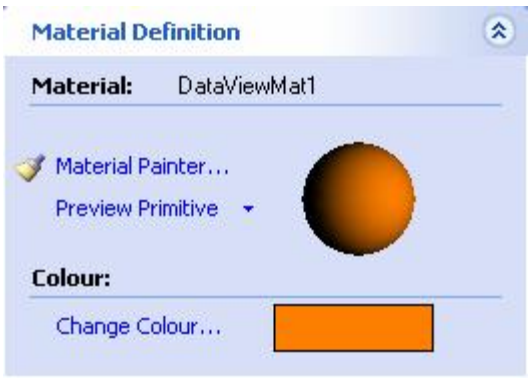
There are no default materials supplied with Review, although you will see some materials defined when you open the **Materials Palette** form. These will correspond to colour numbers in the model, if you have one loaded, and the Scale Man.

Materials are created, edited, copied and deleted by clicking the **Material Definition** button on the toolbar (or select **View>Material Definition**).

8.1 The Materials Palette Form

The **Materials Palette** form shows the properties of the current material, which is the material you are editing; by default, this will be the first material in Review's list of materials. You can change the current material as much as you like until you obtain the effect you want. Then you must save the material definition by clicking **Apply Changes**.

If you have created a new material, it will be added to the materials list so that you can apply it to the model. When you edit an existing material, saving it will apply the changes to the existing material in the materials list and in the model.



The **Materials Definition** panel contains the following elements:

- A *primitive* (by default, a sphere) representing the current material. To rotate this primitive, place the pointer over it and move the mouse while holding down the middle mouse button (the speed of the pointer affects the speed of rotation).
- The *Material Painter* provides a way to apply the material of the currently selected item to other elements. Clicking on **Material Painter…** changes the pointer to a 'paintbrush' ( ), able to paint elements in the **Observer View** with the current material.
- You can change the primitive shape used to preview the current material. Clicking on **Preview Primitive…** will cycle through sphere, cube, circular pyramid and hemisphere shapes.
- The **Change Colour…** control which brings up the Windows **Color** dialog box, enabling you to set the colour of the material

The **Select material of**: text box (at the top of the **Materials Palette** form) allows you to either type the name of an element into this box, or pick the element in the graphics area (using the left mouse button as usual), and paste it into the text box. Click **Select Material Of** and the information on the form will be updated to show the properties of the current material.

If you have changed the properties of the current material but not saved it, and you want to return to the stored definition, click **Discard Changes**. If you dismiss the form and then display it again, it will be the same as when it was dismissed.

8.2 Creating Materials

To create a *new material*, click **New Material…**. The **New Material** text box will appear in which to enter the name of the new material. Material names must be unique: if you enter a name that exists already you will see a message telling you that you must choose another name. Names can contain spaces. Click **OK** form to create the material.

At this stage the new material will be the current material. It will be black, with default surface properties. Set the colour using the **Change Colour…** control.

8.3 Editing Materials

To edit an *existing material*, first select the material in one of the following ways:

- Select an element in the model and paste its name into the **Select material of**: text box. A primitive with the selected material will appear within the **Material Definition** pane.
- Select an alternative material by clicking on its icon within the display at the top of the **Materials Palette** form. The information within the **Materials Definition** panel will be updated to show the selected material.

By default, all existing materials are displayed as spheres. The colours and other properties, including textures, are shown. Note that the sphere showing the current material looks as if it is on a button which has been pressed, and the name of the selected material is shown in the title bar of the **Materials Palette** form.

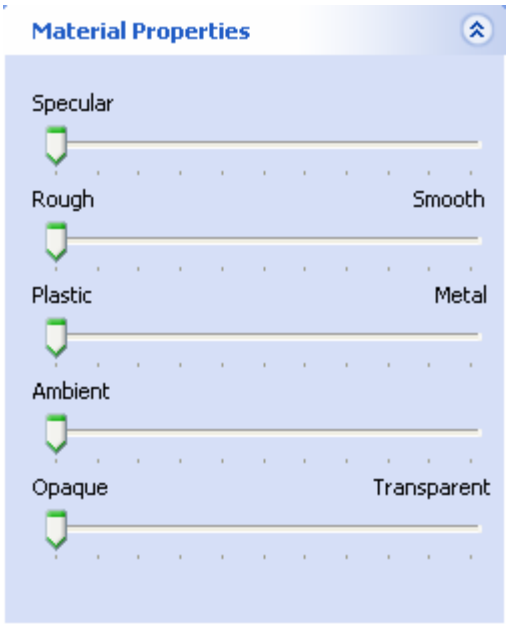
Note: You can change the material applied to selected elements by **selecting Edit>Make DrawList>Change Materials…** on the **DrawList** form (see Section 9).

As an alternative to the spherical icons, the material list can be displayed as a scrolling list of material names. To switch to this type of display, click at the top of the **Materials Palette** form. If you have many materials defined, and you know which ones you want, it is quicker to use the scrolling list. Click to return to the icon display.

Note that if you open the **Materials Palette** form with no model loaded, the only colours you see are those used to display the Scale Man, and any new materials you have created.

8.4 Setting Material Properties

Material colours are set from the **Color** form. To set other material properties, select the **Material Properties** pane:



The slider bars are as follows:

Slide Bar	Function
Specular	The brightness of the highlight.
Rough-Smooth	The spread of the highlight.
Plastic-Metal	The colour of the highlight. Plastic materials have a highlight coloured by the incident light (usually white); metallic material highlights are determined by their base colour.
Ambient	The contribution of ambient light to the material brightness.
Opaque-Transparent	The opacity (transparency) of the material.

The effect of moving the sliders is shown immediately on the preview primitive in the **Materials Definition** pane. **Discard Changes** at the top of the **Materials Palette** form returns the sliders to the values they had when the form was displayed. If you dismiss the panel and then redisplay it, the sliders will be the same as when the form was dismissed.

If you are defining a new material, the default settings of the surface properties are displayed.

8.5 Textures

Textures can be applied to materials, starting from the **Texture Properties** pane:

The use of textures is described fully in Section 17.

9 Controlling How Much of the Model is Drawn

This Section explains how to specify which parts of the complete design model are to be included in the graphical display. The principal ways of doing this are:

- By editing the **DrawList** which identifies the specific elements which are available for display.
- By defining a 3D volume (a *clip volume*) such that only elements which are wholly inside or outside that volume (you can specify which) are drawn.

9.1 The DrawList Form

When you first loaded your design data into Review, you used the **Import Model Data** form to specify which design elements were to be shown in the **Observer View** graphical window. You can use a very similar form the **DrawList** form, to modify the contents of the display at any time.

To access the **DrawList** form, select **View>DrawList**.

To add elements to the current **DrawList**, carry out the following steps:

1. In the **Explorer** view, select an element you wish to add to the **DrawList** and select **Copy** from the shortcut menu.
2. With the pointer in the main list area of the **DrawList** form, select **Paste** from the shortcut menu.
3. To remove elements from the **DrawList**, should you make a mistake or change your mind, select the redundant elements in the **DrawList** (using the ⇧ (**shift**) and **Ctrl** keys in the normal Windows-compliant way) and select the required **Edit>Remove>** option from the **DrawList** form's pulldown menu**.**

Repeat Steps 1 to 3 until the **DrawList** contains all of the required elements.

Edit>Delete DrawList removes the specified elements from the display permanently; in effect, it removes them from the **Addlist** of the **Model Data**, so that they are no longer available for displaying. You can only restore these elements to the displayed model by reloading the data from the source files.

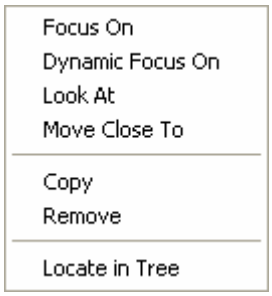
9.2 Changing the Display of DrawList Selections

When the **DrawList** shows those elements whose display characteristics you want to change, use the **Edit** options from the **DrawList** form's menu bar to change their appearance as described below.

Option	Function
Edit>Make Drawlist>Visible	Adds the specified elements back into the display (assuming that they are currently invisible).
Edit>Make Drawlist>Invisible	Removes the specified elements from the display.
Edit>Make Drawlist>Translucent	Causes all the specified elements to be shown in a translucent state, so that objects behind them can be seen as well.
Edit>Make Drawlist>Wireframe	Displays the specified elements in wireframe format, regardless of the currently defined **Camera View** representation.
Edit>Make Drawlist AutoTag	Displays autotagging names 'stencilled' onto the specified elements (autotags appear on boxes and cylinders only). **Edit>Make Drawlist UnAutoTag** removes the autotag names.
Edit>Make Drawlist>Change Materials…	Gives the **Change Material (Drawlist)** form, enabling you to change the material used to display the **Drawlist** members. See Chapter 8.

9.3 Shortcut Menus on DrawList Members

The following shortcut menu is available over items in the **DrawList** form:



The functions from this menu are shown below

Option	Function
Dynamic Focus On	Dynamically moves the camera near to the selected item and orients the camera such that the item is in the centre of the View.
Focus On	As above, but without dynamic movement.
Look At	Re-orients the camera to look towards the identified element but with no movement of the camera.
Move Close To	Moves the camera to a short distance away from the identified element and looking at it. Unlike **Focus On** commands this operation does not attempt to fit the item in into the graphics window.
Copy	Copies the name of the selected item or items to the clipboard.
Paste	Pastes the selected items into the list from the clipboard.
Remove	Removes the selected items from the list.
Locate In Tree	Locates the item in the **Explorer** window and makes it the active selected item in the Tree View.

9.4 Defining a Clip Volume

A *clip volume* (or *limits box*) defines a 3D rectangular volume within the model space, such that objects may be selected according to whether or not they fall partially or wholly within that volume.

A clip volume is defined in terms of the spatial coordinates of two diagonally opposed corners. You may set up such a volume definition in one of the following ways:

9.4.1 Defining Specific Clip Volume Coordinates

1. **Select Edit>Clip Volume>Edit**… from the DrawList menu bar to display a Clip Volume Definition form.
   - To define a new clip volume, select **Edit>New** from the **Clip Volume Definition** menu.
   - To modify an existing clip volume, select **Edit>Open** from the **Clip Volume Definition** menu and then select, from the displayed list, the name of the clip volume to be edited.

The **Current Clip Volume** heading on the form shows the name of the current clip volume, or it shows **No Current Clip Volume** if you are creating a new clip volume.

2. Define two diagonally opposed corners for the clip volume by entering specific coordinates in the two sets of text boxes, using the option buttons to toggle between North/South, East/West and Up/Down as necessary. Alternatively use the pick and past facility to define the clip volume using elements selected from the **Observer View**.
3. Select **Edit>Save As** to name and store a new clip volume definition (or to copy an existing one), or select **Edit>Save** to update the definition of an existing clip volume.

9.4.2 Defining a Clip Volume on the Keyplan View

You can define a clip volume graphically by picking points in a **Keyplan View** window. This is often more convenient than calculating and entering specific coordinates.

1. **Select Edit>Clip Volume>Edit…** from the **DrawList** form to display a **Clip Volume Definition** form.
2. Open a **Keyplan View** window (if not already open) by clicking the button in the toolbar.
3. Select the button. If the button is already selected, deselect it and select it again.
4. The default size and position for a clip volume are such that the volume just encloses the whole of the content of the first model file read in. To change the dimensions of the current clip volume (whose outline is drawn in the **Keyplan**), drag its sides to the required locations in a plan or elevation view. To change the position of the current clip volume without changing its dimensions, position the pointer inside the clip volume and drag it to the required location.
5. Note that as you edit the clip volume outline on the **Keyplan**, its defining coordinates are updated automatically on the **Clip Volume Definition** form.
6. Select **Edit>Save As…** to name a new clip volume (or copy an existing one), or select **Edit>Save** to update the definition of an existing clip volume. Note that these options store the definitions internally for the duration of your current Review session only. They do *not* save the definitions in an external file. To list the names of all currently defined clip volumes, select **Edit>Open**.

To delete the current clip volume, select **Edit>Delete** from the **Clip Volume Control** form's menu.

9.5 Using a Clip Volume

Having defined one or more clip volumes, you may then use them to remove selected parts of the design model from the display. Do this as follows:

1. Use the **Edit>ClipVolume>Clip>** menu options on the **DrawList** menu to specify how the **Observer View** display is to be affected by one of the clip volumes. The choices available for clipping the displayed model are as follows:

Option	Function
Outside and Section…	This cancels the effects of any current clipping and then removes from the display all elements which are wholly outside the selected clip volume. Items intersected by the clip volume are Sectioned and capped.
Outside…	Only those elements which are wholly or partially inside the clip volume remain displayed.
Inside…	Only those elements which are wholly outside the clip volume remain displayed.
Local Inside…	This leaves the effects of any existing clipping in force and then removes from the display all elements which are wholly or partially inside the selected clip volume. This allows you to remove separate parts of the design model in a progressive manner, effectively 'nibbling away' unwanted parts of the display one by one.
From Model files…	This deletes all current model file data and then partially reloads the original files such that only those elements which are wholly or partially inside the current clip volume are reloaded. (Use this option with caution: use **Clip Outside** instead if you are likely to want to restore the full display in your current Review session without reloading the model file.)

2. The use of any **Clip Volume>Clip>** option displays a form containing a list of all currently defined clip volumes. From the list, select the clip volume which you wish to use. Alternatively, select the button in the **Keyplan View** window and pick the required clip volume using the left-hand mouse button. Paste its name into the text box on the **Select Clip Volume** form by using the middle mouse button.

9.6 Restoring a Clipped Display

To remove all clip volume effects, thus restoring the full design model display, select **Edit>Clip Volume>Undo Clipping** from the **DrawList** menu.

Note: This applies only to displays which have been clipped using the **Edit>Clip Volume>Clip>Outside, Inside** or **Local Inside** options. Displays clipped using the **Edit>Clip>From Model Files** option may be restored only by reloading the original data file

10 Adjusting the Light Sources

The model can be illuminated by any combination of ambient light and up to seven individual light sources. This chapter explains how to adjust the positions, colours and intensities of the light sources, and whether the lights cast shadows.

To control the model lighting, click the **Lighting** button on the toolbar (or select **View>Lighting Control**). This displays a **Light Definition** form which allows you to set the characteristics of each light source.

10.1 Setting the Type of Illumination

Use the two option lists near the top of the form to select the light you wish to modify (Ambient, or Light 1 to 7) and the *type* of light you wish to apply.

Note the button switches the light on and off.

Ambient light represents a non-directional light source illuminating the whole model. This affects all surfaces equally, irrespective of their positions. You can switch ambient light on and off, but you cannot change its properties.

All the other lights can be set to the following types:

Type	Description
Infinite	Directional wrt Viewer gives a parallel directional light whose position is fixed relative to the observer's eye point (like a light held by the observer). This is the default type for all lights. Both types of infinite light can cast shadows.
Infinite	Directional wrt Model gives a parallel directional light whose position is fixed relative to that of the model (like the sun). Both types of infinite lights can cast shadows.
Local	These lights represent omnidirectional light sources, usually positioned within the model (like an unshielded light bulb fixed to part of the model's structure). These provide local illumination of surfaces which are orientated towards the position of the light source and have fixed positions with respect to the model.
Spot Light	Gives a cone of light from a given position along a given direction.

Each light source is defined in terms of its intensity, its colour, and its direction (for a parallel source at infinity) or its position (for a local point source).

10.1.1 Setting the Intensity and Colour

For all lights except *Ambient*, use the option list near the top right-hand corner of the form to specify the type of illumination for the current light.

Use the **Intensity** sliding scale and the **Choose...** button (to give the Windows **Colour** form) to set the overall intensity and the colour mix for the current light. The chosen colour will appear in the box adjacent to the **Choose...** button.

10.1.2 Setting the Direction or Position

Click the **Edit Position** button on the **Light Definition** form. This displays a **Light Position** form.

Use the **Positioning** option list to select the light whose position you wish to modify. (This need not be the same as that selected on the **Light Definition** form and is not, of course, applicable to Ambient light.) Having set the required options, **Apply** the form. If you select a light which has been defined as Infinite, only the **Direction** controls on the form will be available to you; if you select a light which has been defined as Local, only the **Position Light At** controls will be available.

Setting the Direction of an Infinite Light Source

To set the direction of a parallel light, either type your required settings directly into the **Bearing** and **Elevation** text boxes, or use the corresponding graphical controls.

When setting the direction of an Infinite, Directional wrt Model light, the bearing and elevation settings define the absolute direction of that light.

When setting the direction of an Infinite, Directional wrt Viewer light, the bearing and elevation settings are defined relative to a viewer looking North. This principle also applies when manipulating Infinite, Directional wrt Viewer lights in the **Keyplan View**s. The default direction for Infinite, Directional wrt Viewer lights is for them to shine from behind the viewer's right shoulder.

Setting the Position of a Local Light Source

To set the position of a local point source at the origin of an element in the display, enter the name of the element in the **Position Light At** text box. As an alternative, you may position the currently selected light source (the active light) by using the **Keyplan View** window. To do so, set the **Lighting** control button, , in the **Keyplan** to On and then drag the displayed light source to the required position. The position of the current light is shown in the **Keyplan** thus: .

Setting the Properties of a Spot Light

To set the direction and position of a spot light, either type the settings directly into the **Bearing** and **Elevation** text boxes, or use the adjacent controls.

The **Spread** option controls the *light cone angle*. The smaller the angle the narrower the cone of light.

The **Exponent** option controls how the light intensity falls off from the centre of the *light cone* to the outer surface of the cone. The minimum value is 0, which gives a gradual fall-off in intensity; the maximum value is 1, which gives a sharp fall-off in intensity.

Exercise:

Tip: The easiest way to check the current settings is to switch each light on in turn, with all others off, and observe the effect on the displayed model as you change the light parameters.

Use the **Light Definition** form to set up white light for Ambient and at least one of each of the other types. For example, set **Light 1** to be Infinite, Directional wrt Viewer; set **Light 2** to be Infinite, Directional wrt Model; and set **Light 3** to be Local.

Switch on each light source in turn (with all others off) and, for each non-ambient light, adjust its position or direction (as appropriate) using the **Light Position** form so that it clearly illuminates the model. Observe the effect on the illumination of the **Observer View** as you rotate the model.

Now switch on different combinations of light sources and again observe the effects on the **Observer View** model. If you wish, try changing the colour of one or more lights.

Finally, use the **Keyplan View**, with the **Lighting** control button **On**, to move the local light(s). Select the **Continuously Update Graphics** button, , so that you can see the effect of moving the light source as you do so.

10.2 Shadows

The **Shadowing** option list on the **Light Definition** form is used to specify that an infinite light will cast shadows. The **Shadowing** option cannot be used for local or spot lights.

The most efficient use of shadows is a static shadow from a light fixed with respect to the model. Unfortunately a static shadow cannot reflect the effect of shadows from moving groups; in this case dynamic shadows should be used.

The larger the **Observer View** window, the better the shadow resolution; but the resolution of shadows is limited and poor results are sometimes inevitable. The larger the **Observer View** window, the longer the time taken to draw the shadow.

To obtain the best possible performance and resolution of shadows, these guidelines should be followed:

- Use static shadows.
- Put the **Observer View** into Fullscreen mode (select **Tools>Options>Full Screen**), so that the shadow is created at the maximum possible resolution.
- Leave Fullscreen mode and resize the **Observer View** to a smaller size.

11 Identifying Objects in the Model

This chapter tells you how you can identify the various objects which make up the displayed design model. It also explains how to carry out some related functions. It covers the following aspects:

- Identifying *primitives* or components by *picking* them with the mouse pointer.
- *Tagging* and *autotagging* primitives or components with automatically generated identifiers.
- *Labelling* primitives or components with user-defined texts.
- Deriving the *distances* between two points (which may be either the origins of specified elements or specified points of the model's surfaces).

11.1 Picking Objects with the Mouse Pointer

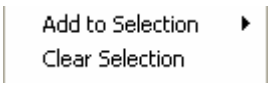
To identify any object which is visible in the **Observer View**, position the pointer within the object and press the left-hand mouse button. The name and model coordinates of the object will be displayed in the status for as long as you keep the button depressed.

To identify several objects in turn, keep the button depressed while moving the pointer from one object to another. When you release the mouse button, the name of the currently selected element is copied to the paste buffer; you can then paste it into any text box by using the middle mouse button. To specify how names of picked elements are to be represented, select **Tools>Options>Preferences** and, on the resulting **Preferences** form, **Selection** tab set **Graphical Selection** to Normal or Pick Significant Element.

- Normal mode stores the full name of the element down to primitive level; for example, **BOX 1 OF /VESS1**.
- Significant Element mode stores the name only down to significant element level (that is, down to the first / in the name text); for example, **/VESS1**.

In advanced picking mode (click on the icon on the toolbar), holding down the **Ctrl** key allows multiple objects to be displayed in the **Observer View**. When this mode it active an element will remain highlighted when it is selected.

Using the **Ctrl** key when in advanced picking mode will add the following to the shortcut menu:



Option	Function
Add to Selection	Displays a pop-up menu containing the owners of the element under the mouse. This allows for any of the owners of the item under the mouse to be added to the selection.
Clear Selection	Clears any selected elements. It is also possible to clear the selection by clicking on blank space, away from any model elements.

11.2 Tagging and Autotagging Objects

The tagging and autotagging functions allow you to show an object's name against it in the display. This lets you identify a component within the plant model easily, without having to pick it using the pointer.

The distinction between the two facilities lies in the way the name text appears in the views:

- *Tagging* shows the naming text in a rectangular frame which is positioned near the object. This text always appears orthogonal to the view direction as you manipulate the model. If the selected object has not been named, the lowest named element directly above it in the database hierarchy will be used to define the tag text.
- *Autotagging* (which applies only to box and cylinder primitives) shows the name as though it were stencilled onto the side of the element. If the element is large enough, the name repeats along its length so that it is always visible even when you can see only part of the object in the view. Only the significant part of the full PDMS name, i.e. the text after the first / character, is shown.

11.2.1 Tagging

To add a tag to an object:

1. Select **Tools>Options>Tag** to display a **Tag Element** form.
2. In the **Name...** text box, enter the name of the object to be tagged. The easiest way to do this is usually by using the pick-and-paste technique.
3. Click the **Tag** button.

To remove a tag from an object:

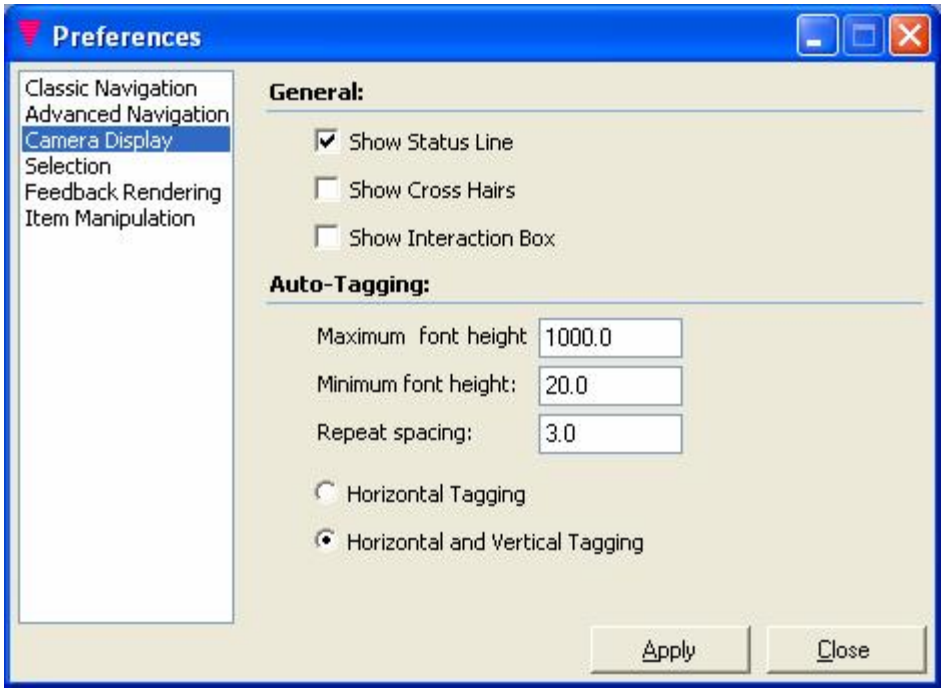
1. Select **Tools>Options>Tag** to display a **Tag Element** form.
2. Click the **Remove** button to display a **Remove Tag** form which includes a list of all currently tagged elements.
3. Select the elements whose tags are to be removed and click the **Remove** button.

Use the **Show All Tags** check box to toggle between showing and hiding all current tags.

11.2.2 Autotagging

To add autotagging to one or more objects:

1. Use the **Edit>Make All>Autotag** menu to set autotagging on.
2. Select **Tools>Options>Preferences** menu to display a **Preferences** form.



3. On the **Camera Display** tab, set the **Maximum font height**, **Minimum font height and Repeat spacing** (for repeating the name along the length of the object) in the current units of measurement. The actual font height used is *derived* automatically from the dimensions of the object on which it is displayed; if this would exceed the maximum setting, the height is scaled down to that maximum; if it would be less than the minimum setting, the autotagging text will not appear on that object. If you set the **Repeat spacing** to less than the length of the naming text (eg to zero), the name will repeat with one character space between each string.
4. The two option buttons control which surfaces of the primitive the name is shown on. Horizontal Tagging (the default) adds the name to the sides of boxes and to two diagonally opposed sides of cylinders. Horizontal and Vertical Tagging also shows the name on the top and bottom of boxes and on the other two sides of cylinders.
5. Click **Apply** to display the autotagging names on the selected items.

To remove autotagging from all objects, use **Edit>Make All>UnAutotag** menu.

11.3 Labelling Objects

The labelling function allows you to attach a line of descriptive text to an object in the display.

To *add a label* to an object:

1. Select **Tools>Options>Label…** to display a **Label Element** form.
2. In the **Name** text box, enter the name of the object to be labelled. The easiest way to do this is usually by using the pick-and-paste technique.
3. In the **Label** text box, enter the descriptive text which is to be displayed next to the object.
4. Click the **Label** button.

To *remove a label* from an object:

1. Select **Tools>Options>Label** to display a Label Element form.
2. Click the **Remove** button to display a **Remove Label** form which includes a list of all currently labelled elements and their associated labelling texts.
3. Select the elements whose labels are to be removed and click the **Remove** button.

To see a list of all currently labelled objects, together with their associated labelling texts, click the **Report…** button to show the **Report On Labels** form.

Use the **Show all labels** check box to toggle between showing and hiding all current labels.

11.4 Measuring Distances in the Displayed Model

You can show the calculated distance between two points in the displayed model in either of two ways:

- As the distance between the origins of two specified elements.
- As the distance between two selected points on the model's surfaces (which may be on different elements or on the surface of a single element).

11.4.1 Distances Between Origins of Elements

This option allows you to specify any two elements and calculate the distance between their origins.

1. Select **Tools>Measure>Origin to Origin**.
2. In the **From…** and **To…** text boxes on the resulting form, enter the names of the objects whose separation is to be calculated. The easiest way to do this is usually by using the pick-and-paste technique.
3. Click the **Measure** button to carry out the calculation.

Both the direct origin-to-origin distance and the horizontal projection of this distance (horizontal true distance) will be shown on the form. The form will also show the displacement of the second origin (the **To** entry) relative to the coordinates of the first origin (the **From** entry).

If the **Show Measure Rod** box is checked, the line of measurement and the associated data will be shown on the **Observer View** display. To remove this from the display, uncheck **Show Measure Rod**.

Note: Only the most recent measurement will be shown on the display at any time.

11.4.2 Distances Between Points on Surfaces

This option allows you to pick any two points on the surfaces of objects in the **Observer View** and calculate the distance between them. These points may be on the surfaces of different objects, or you can pick two different points on the surface of a single object.

1. Select **Tools>Measure>Surface to Surface**.
2. To initiate a new measurement, click the Measure button.
3. When prompted, use the left-hand mouse button to pick the two points whose separation is to be calculated. The calculation will be carried out as soon as you have picked the second point.

Note: You cannot pick a point in free space; both points must lie on the surfaces of elements within the model. For maximum accuracy, use the Pan/Rotate/Zoom functions to display a close-up view of each part of the model in which you wish to pick a point.

Both the direct point-to-point distance and the horizontal projection of this distance (horizontal true distance) will be shown on the form. The form will also show the displacement of the second point relative to the coordinates of the first point.

If the **Show Measure Rod** box is checked, the line of measurement and the associated data will be shown on the **Observer View** display. To remove this from the display, uncheck **Show Measure Rod**.

Note: Only the most recent measurement will be shown on the display at any time.

12 Working with Groups (Including the Scale Man)

This chapter explains how you can link displayed elements together into logical groups, so that you can manipulate them collectively. It covers the following aspects:

- *Defining* a group in terms of its constituent elements.
- *Manipulating* a group as a composite entity.
- Checking for *clashes* between a moving group and other objects within the model.
- Using the *Scale Man* (a special predefined group).
- Defining and positioning *signboards* carrying text and/or graphical images in the display.

The principal use of the group function is to allow you to move a collection of elements together as part of an animation sequence, as explained in Chapter 13.

12.1 Using the Groups Form

All group definition and manipulation functions are controlled from the **Groups** form. To display this, click on the **Groups** button in the toolbar or select **View>Groups**.

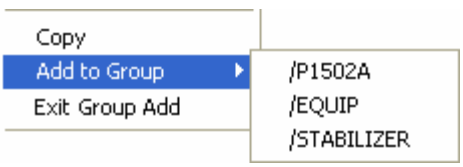
12.2 Defining and Positioning a Group

12.2.1 Defining the Group's Constituent Items

A group may contain any number of objects in the design model, from a single primitive up to the whole model. To create a new group, click **New Group…** in the top-most panel of the **Groups** form, enter the name of the group in the resulting **Name Group** text box and click **OK**.

To populate the group, click **Pick Contents from Observer…** in the **Contents** panel of the **Groups** form and click on objects in the **Observer View** that you wish to add to the group (the pointer will change to a 'hand' symbol ( ). Click **Pick Contents from Observer…** again when you have finished.

When in this mode the shortcut menu for elements in the **Observer View** contains the following extra entries:



Option	Function
Add to Group	Displays a popup menu containing the owners of the item under the mouse. This allows for owning elements to be added to the list.
Exit Group Add	Exits from the Pick Contents from Observer mode.

Alternatively, select the elements in the **Explorer** view that you wish to group, **Copy** the elements (shortcut menu) in the **Explorer** window and **Paste** them (shortcut menu) into the **Contents** panel of the **Groups** form. (Note that standard Windows selection techniques can be used here to add several elements into the group contents list with a single paste operation.)

> **Note:** When the Scaleman group is selected the **Contents** panel is not visible. This is because it is not possible to modify the contents of this group.

To modify an existing group, click on the required group in the top panel of the **Groups** form. Add new members to the group as explained above, or remove members from the group by selecting the member to be removed and clicking on **Remove Selected**.

The *name* of an existing group may be changed by clicking on the required group in the top panel of the **Groups** form and selecting **Rename** from the shortcut menu.

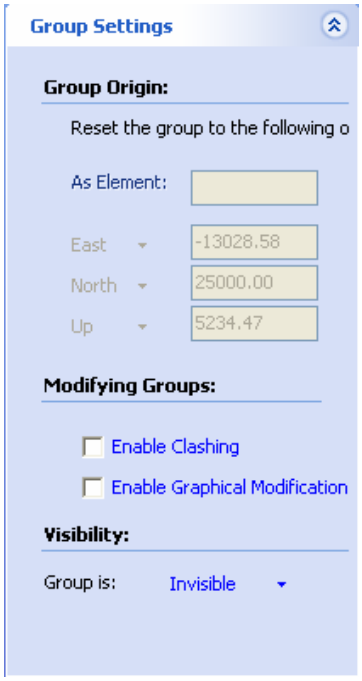
Focus on Group moves the **Observer View** to the group and orients the camera to look at it.

12.2.2 Storing the Group Definition

Before you carry out any manipulation of a new group, you must store its definition so that it becomes available in the selection lists of the relevant forms. To do so, click on the required group in the top panel of the **Groups** form, click on **Save As…**, name the group in the resulting **Save Group** text box and click **OK**. Note that these options store the definitions internally for the duration of your current Review session only. They do *not* save the definitions in an external file.

12.2.3 Positioning the Group

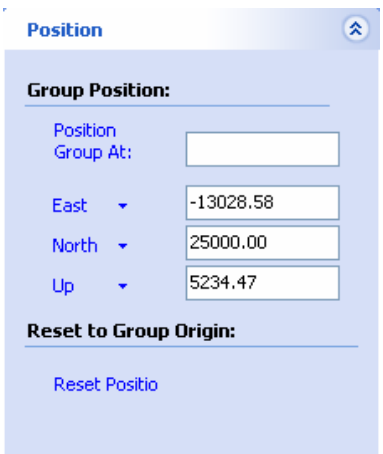
Defining the Group Origin



Using the **Group Settings** panel of the **Groups** form, enter the coordinates of the point which is to be treated as the origin in the **North/South**, **East/West** and **Up/Down** text boxes. Alternatively, enter the name of an element whose origin corresponds to the required point in the **As Element** text box.

Tip: Remember the pick-and-paste technique using the left-hand and middle mouse buttons; an element name can also be pasted at this point after it has been copied from its selection in the **Explorer**.

Positioning the Group Origin



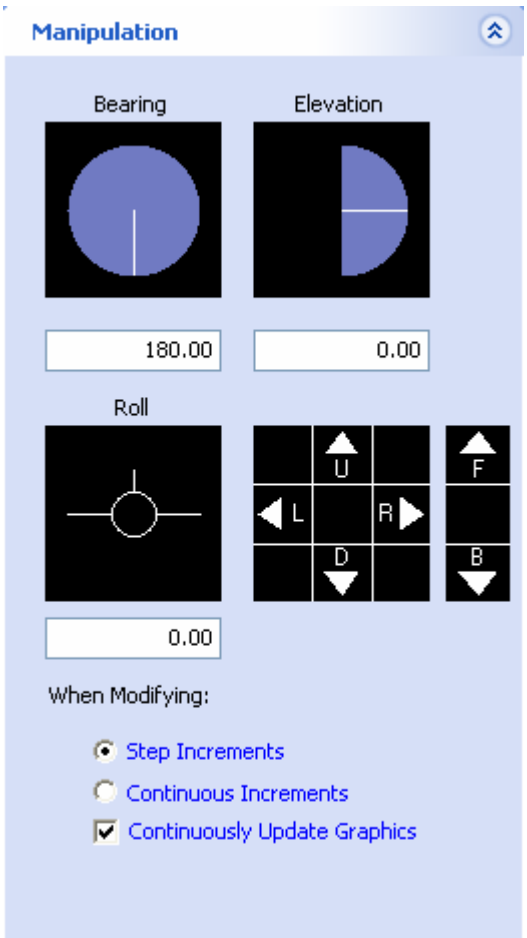
Using the **Position** panel of the **Groups** form, enter the coordinates of the point to which you wish to move the origin in the **North/South**, **East/West** and **Up/Down** text boxes. Alternatively, enter the name of an element whose origin corresponds with the required point in the **Position Group At**: text box. Pressing Enter at this point will cause the group to move in the **Observer View**. Click **Reset Position** to reset the group position to the group origin.

12.2.4 Listing and Removing Group Definitions

All groups defined for the current session will be displayed within the top panel of the **Groups** form. To delete a group, click on the group in the top panel of the **Groups** form and click **Delete Group**.

Note: You should *not* try to delete the Scaleman definitio

12.3 Manipulating a Group

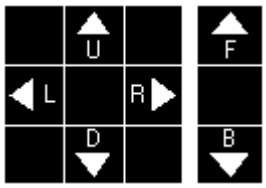


You can manipulate a group, as a single entity by using graphical controls on the **Manipulation** panel of the **Groups** form, by using the *locator handle*, or by using the **Keyplan View**.

12.3.1 Manipulation Using Graphical Controls

The rotational movement controls (for changing the *Bearing*, *Elevation* and angle of *Roll*) operate in the same way as those for manipulating the **Observer View**.

The *translational movement* controls (for changing the position of the group's origin) are similar to the **Pan** controls used for manipulating the **Observer View**, but include two additional arrow controls to move the origin Forwards or Backwards:



The arrowed regions behave in similar ways to the corresponding screen regions used for panning the **Observer View** thus:

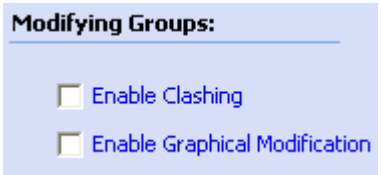
- The *direction* of movement depends on which arrow-box the pointer is in.
- In Continuous mode (Classic view manipulation mode only), the extent of movement depends on the position of the pointer within the arrow-box: the closer it is to the tip of the arrow head, the larger each translational step. The maximum step size corresponds to the current translational increment for groups: you can change this, if necessary, by first entering the required value in the **Movement Increments** text box of the **Group Settings** pane.

If **Continuously Update Graphics** is selected, movement of the group will be shown continuously as you use the controls. If **Continuously Update Graphics** is not selected, movement will only occur when you release the mouse button.

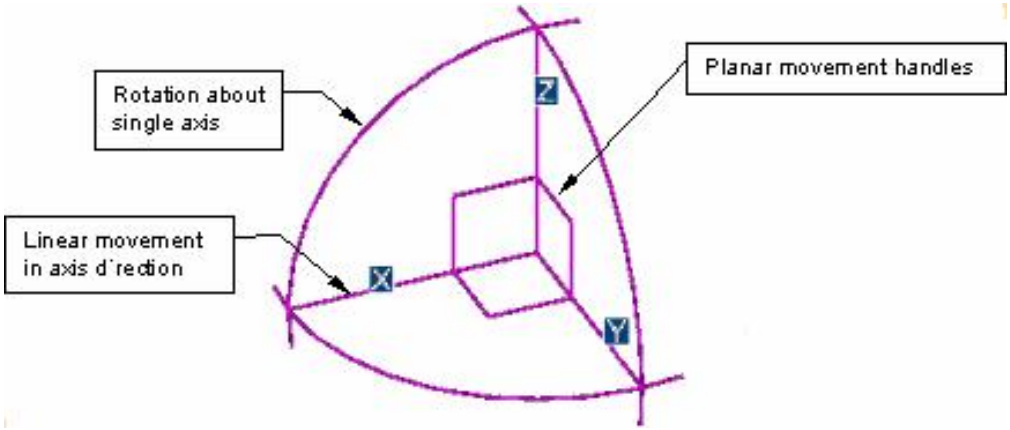
If **Step Increments** is selected, translational movements using the arrow controls moves the group's origin by the amount defined by the current translational increment for groups. If **Step Increments** is left clear, movement is in Continuous mode and is proportional to the position of the pointer along the arrow's axis.

Note: To modify the extent of each rotational or translational increment temporarily, hold down the ⇧ (shift) key to reduce the increment by a factor of 10 (giving a finer control) or hold down the Ctrl key to increase the increment by a factor of 10 (giving a coarser control).

Manipulation Using the locator handles



In the **Group Settings** pane. In this manipulation mode, a *group* can be moved or rotated dynamically by dragging with the mouse pointer. The *locator handles* are displayed, at the group origin, by selecting **Enable Graphical Modification** on the **Group Settings** panel on the **Groups** form.

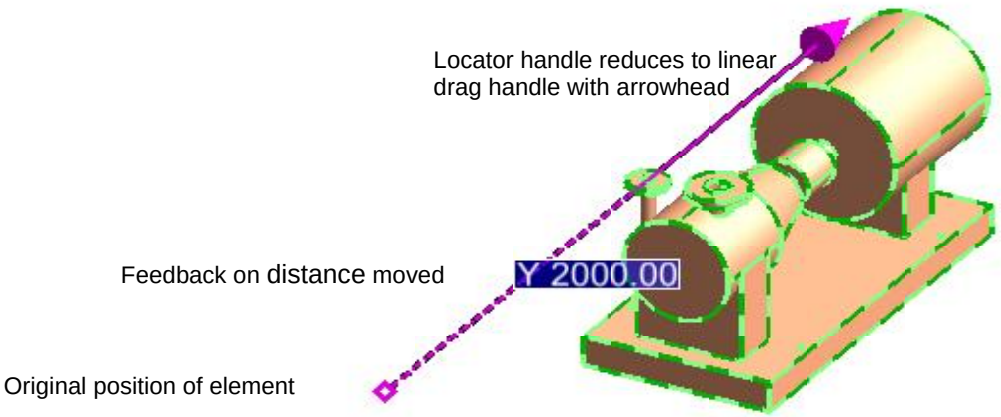


12.3.2 Moving a group along a straight line

1. Press and hold down the left- or right-hand mouse button on a linear movement handle.
2. With the mouse button still held down, move the pointer in the direction of the movement handle. The group follows the movement of the pointer.

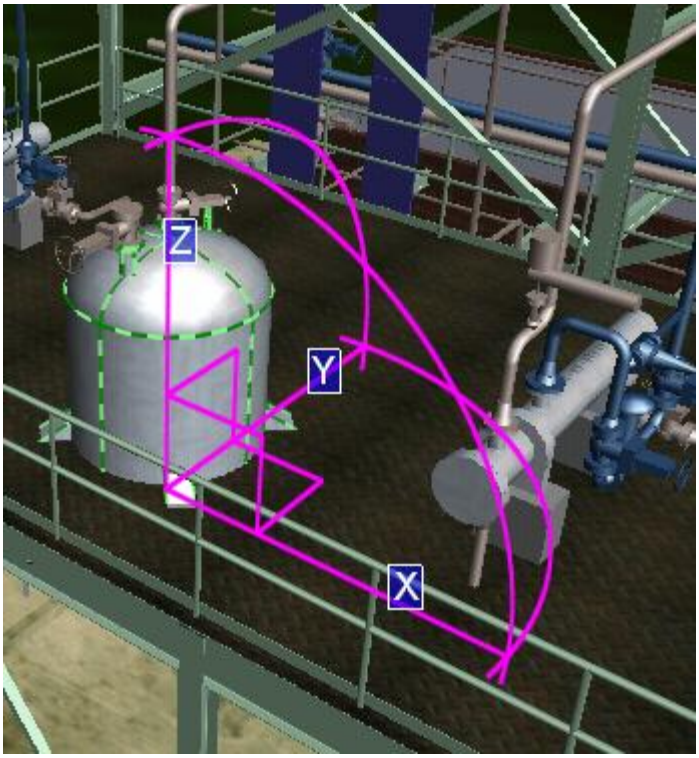
Graphical feedback will be given, showing the distance moved. The movement will be in increments, as defined from the **Manipulation Increments** (**Translation**) text box of the Item **Manipulation** panel of the **Preferences** form.

The original position of the locator handle will also be marked. See below.


Locator handle reduces to linear drag handle with arrowhead
Feedback on distance moved
Y 2000.00
Original position of element

At any point during the drag pressing **Esc** will cancel the action and return the group to its position before the drag was initiated.

When the locator handle is active the group will be highlighted in wire frame and the locator handle will be displayed at the origin of the group. An example of this can be seen below.



A shortcut menu is available on the linear movement handle prior to a drag. The **Move Handle** options enable the *drag handle* to be moved.

Option	Function
Enter Value…	Brings up the **locator handle – Enter Value** form which enables you to enter an explicit distance to move the group in the direction of the handle.

Option	Function
Set 3D Position…	Brings up the **locator handle – Enter Value** form which enables you to move the group to an explicit position. Clicking **Preview…** moves the group as specified. Clicking **Ok** confirms the move.
Set Increments	Brings up the **Preferences** form which enables you to set the movement and rotation increments for the *locator handle*
Move Handle>Enter Value…	Brings up the **locator handle – Enter Value** form which enables you to enter an explicit distance to move the handle in the handle direction.
Move Handle>Set 3D Position…	Brings up the **locator handle – Enter Value** form which enables you to move the handle to an explicit position. Clicking **Preview…** moves the handle as specified. Clicking **Ok** confirms the move.
Move Handle>To Group Origin	Resets the handle position to the group origin.
Cancel	Cancels the shortcut menu.

A further shortcut menu is available on the linear movement handle during a drag:

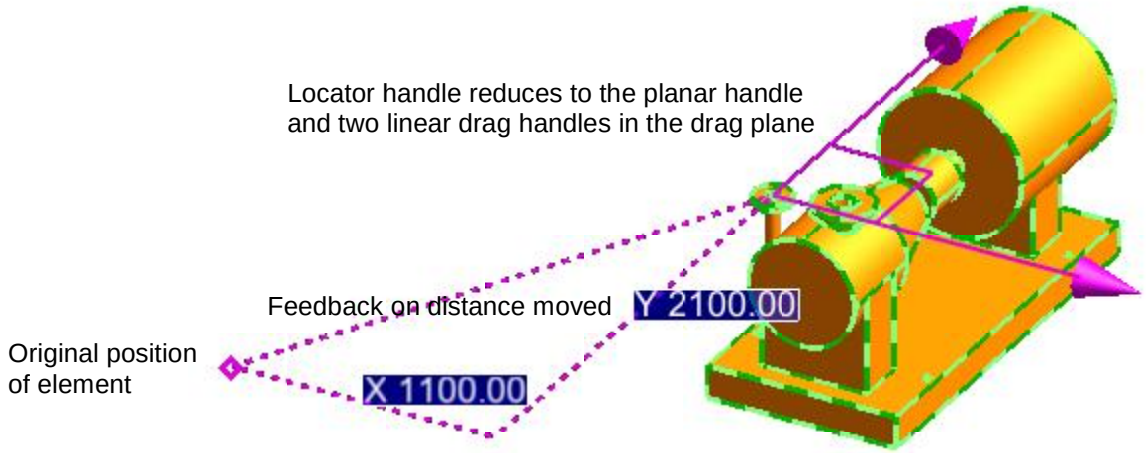
Option	Function
Move Here	Moves the *group* by the amount specified by the drag
Cancel	Cancels the shortcut menu.

12.3.3 Moving a group in a plane

1. Press and hold down the left- or right-hand mouse button on a planar movement handle.
2. With the mouse button still held down, move the pointer as required. The group follows the movement of the pointer, constrained to be within the selected plane.

Graphical feedback is given in the form of a triangle, displayed on the current constraint plane between the original position of the handle and the current position. The relative movement distances are shown on the sides of the triangle. All values are

shown in the current selected units. The *locator handle* changes to a simpler version of the full handle to show the plane of movement as shown below.


Locator handle reduces to the planar handle
and two linear drag handles in the drag plane
Feedback on distance moved
Y 2100.00
Original position
of element
X 1100.00

A shortcut menu is available on the planar movement handle prior to a drag. The **Move Handle** options enable the drag handle to be moved.

Option	Function
Enter Values…	Brings up the **locator handle – Enter Value** form which enables you to enter explicit distances to move the *group* along the selected plane.
Set 3D Position…	Brings up the **locator handle – Enter Value** form which enables you to move the group to an explicit position. Clicking **Preview…** moves the group as specified. Clicking **Ok** confirms the move.
Set Increments	Brings up the **Preferences** form which enables you to set the movement and rotation increments for the locator handle

Option	Function
Move Handle>Enter Values…	Brings up the **locator handle – Enter Value** form which enables you to enter explicit distance to move the *handle* along the selected plane.
Move Handle>Set 3D Position…	Brings up the **locator handle – Enter Value** form which enables you to move the handle to an explicit position. Clicking **Preview…** moves the handle as specified. Clicking **Ok** confirms the move.
Move Handle>To Group Origin	Resets the *handle* position to the group origin.
Cancel	Cancels the shortcut menu.

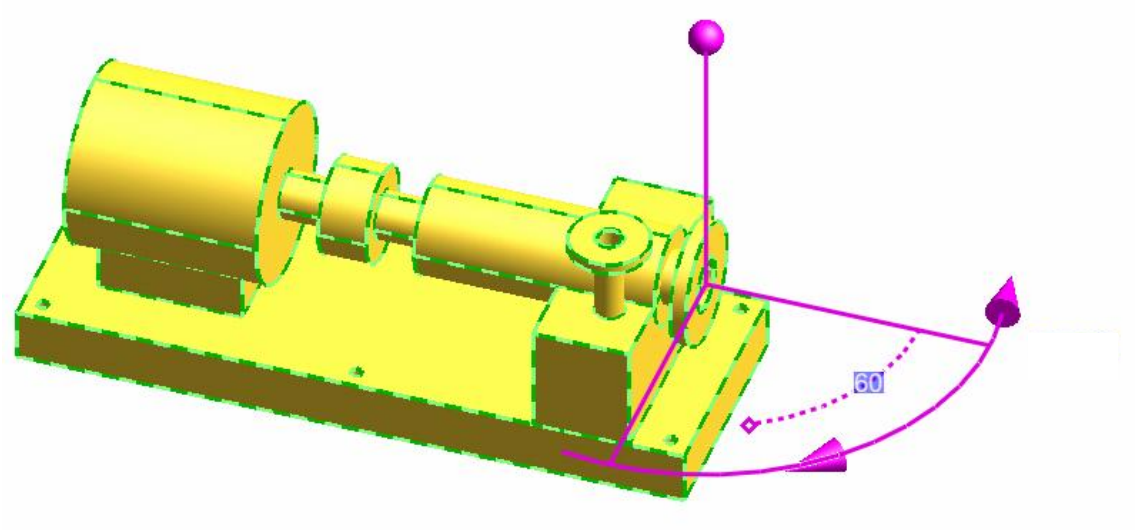
A further shortcut menu is available on the planar movement handle during a drag:

Option	Function
Move Here	Moves the *group* by the amount specified by the drag
Cancel	Cancels the shortcut menu.

12.3.4 Rotating a group about a selected axis

1. Press and hold down the left- or right-hand mouse button on a rotation handle.
2. With the mouse button still held down, move the pointer along the arc of the rotation handle. The group follows the movement of the pointer.

Graphical feedback will be given, showing the angular displacement. The original orientation of the locator handle will also be marked.



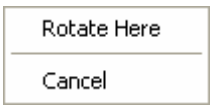
As the mouse moves over a rotation handle, the pointer changes to the rotation drag symbol, and half of the rotation handle arc changes to show two arrows.

A shortcut menu is available on the rotation handle prior to a rotate. The **Rotate Handle** options enable the *drag handle* to be rotated.

Option	Function
Enter Value…	Brings up the **locator handle – Enter Value** form which enables you to enter an explicit angle to move the group through.
Rotate Handle>Enter Value…	Brings up the **locator handle – Enter Value** form which enables you to enter an explicit angle to move the handle through.
Rotate Handle>To World	Aligns the locator handle with the World axis. Useful when, for example, it is necessary to move the group up but the local orientation of the handle does not have a handle pointing directly up.
Rotation Handle>To Group Orientation	Aligns the locator handle with the orientation of the group.

Option	Function
Set Increments	Brings up the preferences form which enables you to set the movement and rotation increments for the locator handle.
Cancel	Cancels the shortcut menu.

A further shortcut menu is available on the rotation handle during a drag:



Option	Function
Rotate Here	Rotates the group by the angle specified by the drag
Cancel	Cancels the shortcut menu.

12.3.5 Moving the Handles using the 'h' key

Rather than use the explicit movement facilities contained in the handle shortcut menus, the handles can be moved *freehand* using the '**h**' key.

Press and hold down the '**h**' key while starting either a drag move or a drag rotate of the handle. Once the move is initiated it is not necessary to keep the '**h**' key pressed.

The drag can then carry on as normal and the handle moves while the group remains stationary. Once the drag is completed by releasing the mouse the handle move will be committed. Subsequent drags with the locator handle will affect the group as normal unless the '**h**' key is pressed.

12.3.6 Resetting the Position and Orientation of a Group

Selecting another group in the **Select Group** form will set the locator handle to the origin and orientation of the selected group with no offsets.

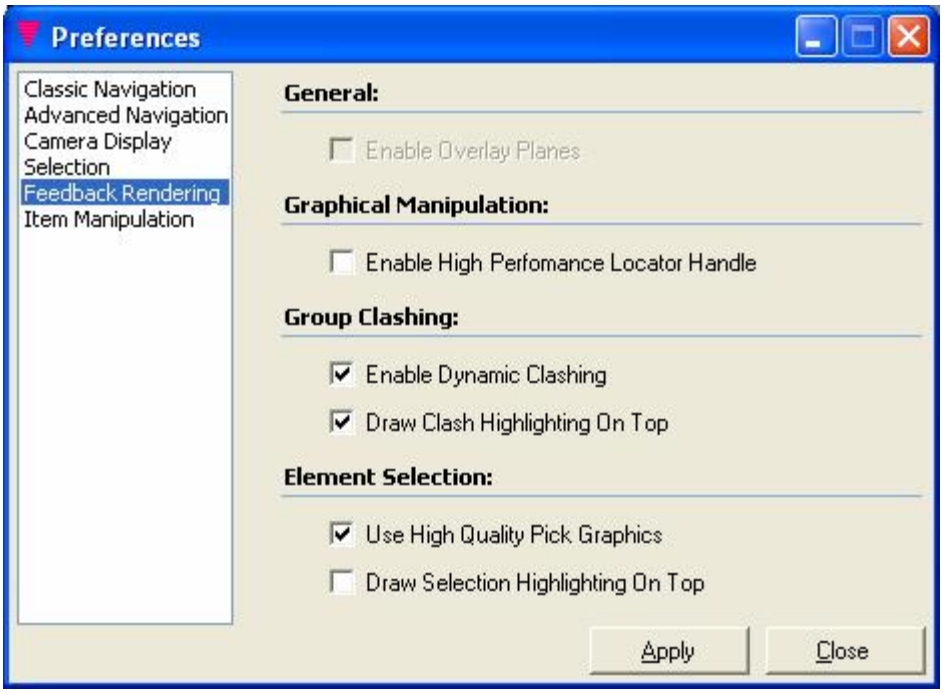
Moving the group via the **Group Control** form will reset the position and orientation of the locator handle to that of the group.

Resetting the position of the group will reset the position and orientation of the locator handle to that of the group.

Setting the origin of the group will reset the position and orientation of the group and set the position and orientation of the locator handle to the origin and orientation of the group.

12.3.7 Varying Group Manipulation Graphical Performance

Options are available on the **Preferences** form (**Tools>Options>Preferences**) for varying the graphical performance when working with graphical manipulation of groups.



Option	Function
Enable Overlay Planes	Defines that overlay planes will be available for use by Review. (Greyed out if no there is no overlay plane facility.)
Enable High Performance locator handle	If selected, the locator handle will be drawn in black and white, or in the overlay planes if they are enabled (see above).
Enable Dynamic Clashing	If selected and Clash Detection mode is on (see Section 12.4), then clashes will be shown dynamically (by a wireline red box) as the group is moved.
Draw Clash Highlighting On Top	Determines whether the red line feedback for clashing is always drawn on top of the model or if it is drawn to fit round the clashing elements.

Option	Function
Draw Selection Highlighting On Top.	When selected, all the lines that highlight an element will be drawn on top of all other model elements, so the lines are visible all the time. When unselected, the highlighting lines are drawn in the model space, so other geometry can obscure them.

12.3.8 Manipulation Using the Keyplan View

You may control all rotational and translational movements of the current active group from within the **Keyplan View**. The type of movement which you can carry out is determined by which of the **Keyplan's Group Control** buttons is set to On. These buttons, identified by a **G** symbol, are mutually exclusive, so that you must switch the current selection Off before you can switch a different one On. Their functions are as follows:

- To reposition the group's *origin*, select the button. The current origin will be shown by a set of three axial arrows in each view. Drag the origin to the required position.
- To change the group's *bearing* and/or *elevation*, select the button. The current orientation will be shown by axial arrows in both **Keyplan Views**. To change the bearing, drag the 'arrowed' axis to the required direction in the plan view. To change the elevation, drag the 'arrowed' axis to the required direction in the elevation view.
- To change the group's *angle of roll*, select the button. The current angle will be shown by axial arrows. Drag the axes to rotate the group to the required angle.

Exercise:

Create a group comprising several adjacent objects in the displayed model and store its definition with any name you choose. List the available groups and note that both your newly named group and the default scale man group are shown.

Move your group within the model, using both the graphical controls on the **Groups** form and the Keyplan facilities. Change, in turn, the group's origin, bearing, elevation and angle of roll.

12.4 Clash Detection

As you move a group within the design model, Review can show you each object which the group touches during its motion. This facility is useful, for example, to check that there is sufficient clearance to remove a piece of equipment from its normal location for maintenance.

For the purposes of checking whether or not a clash occurs, each group is assumed to occupy the whole of an enclosing rectangular limits box. The individual outlines of the objects within the group are ignored, thus tending towards a fail-safe mode of clash detection.

To switch clash detection on or off, select **Enable Clashing** on the **Group Settings** panel of the **Groups** form. When clash detection is selected , and a yellow box is drawn round the group to indicate its limits box.

When clash detection is switched on, each object which is touched by a moving group is highlighted in red in the **Observer View** display. If the group is moving continuously and is clashing, then the highlighting flashes.

12.5 The Scale Man

The scale man is a special group of primitives representing a model of a man holding a 2 metre pole to give an indication of scale. The scale man definition is supplied as part of the standard program and is always available from the main menu.

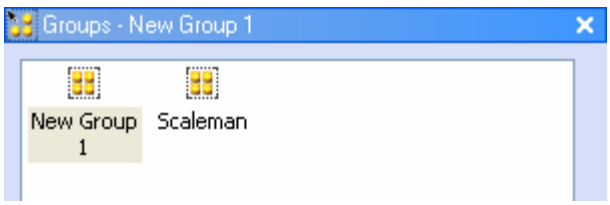
12.5.1 Displaying the Scale Man

If the man does not appear in the display, select **Tools>Scaleman>Make>Opaque** and ensure that the man's position lies within the displayed view.

12.5.2 Moving the Scale Man

You can position and move the scale man within the model by using any of the group manipulation options. To access the appropriate controls, select **Tools>Scaleman>**. The man's axes are such that the Forwards, Backwards, Up, Down, Left, and Right translations behave exactly as you would expect if you imagine yourself in the man's position.

By default, the scale man is normally the current active group. If, however, the **Groups** form is being displayed and the current active group is *not* the scale man, you can make the scale man the current active group simply by clicking on it in the group window.



The **Groups** form then operates on the scale man.

To return the scale man to his default position at any time, select **Tools>Scaleman>Reset Position**.

To position the scale man at the observer's eye point and set his orientation to that of the observer, select **Tools>Scaleman>Set>Man To Observer**.

To change the observer's position and orientation to those of the scale man, select **Tools>Scaleman>Set>Observer To Man**. This automatically sets the rotation mode to Eye and aligns the view direction with the scale man's forward axis, so that the **Observer View** shows what the man is seeing.

To position the scale man at the origin of an element, select **Tools>Scaleman>Position At…** and enter the element name on the form.

To position the scale man on a surface, select **Tools>Scaleman>Position On Surface** and pick a position on an element using the left mouse button.

12.5.3 Connecting the Scale Man and the Observer

You can connect the position and orientation of the scale man to those of the observer, and vice versa, such that moving one moves the other automatically. The menu options for doing so, and their effects, are as follows:

Option	Function
Tools>Scaleman>Connect>Man To Observer	This causes the scale man to follow the observer whenever the **Observer View** is changed. All displayed graphical views will be updated to show the movement of the scale man through the model (which may slow the performance, since more views may need to be redrawn than in the unconnected state). You can still move the scale man independently, without changing the observer's position, but if you then move the observer the scale man will be reset automatically to the new observer position.
Tools>Scaleman>Connect>Observer To Man	This causes the observer to follow the scale man whenever the latter is moved, so that the **Observer View** always shows what the scale man is seeing. These menu options operate as toggles, so that consecutive selections connect and disconnect the scale man and the observer. A marker against each menu option indicates when the connected state is in force. The two methods of interconnecting the scale man and the observer operate independently, so that you can have either or both in operation at any time.

12.6 Adding Signboards to the Display

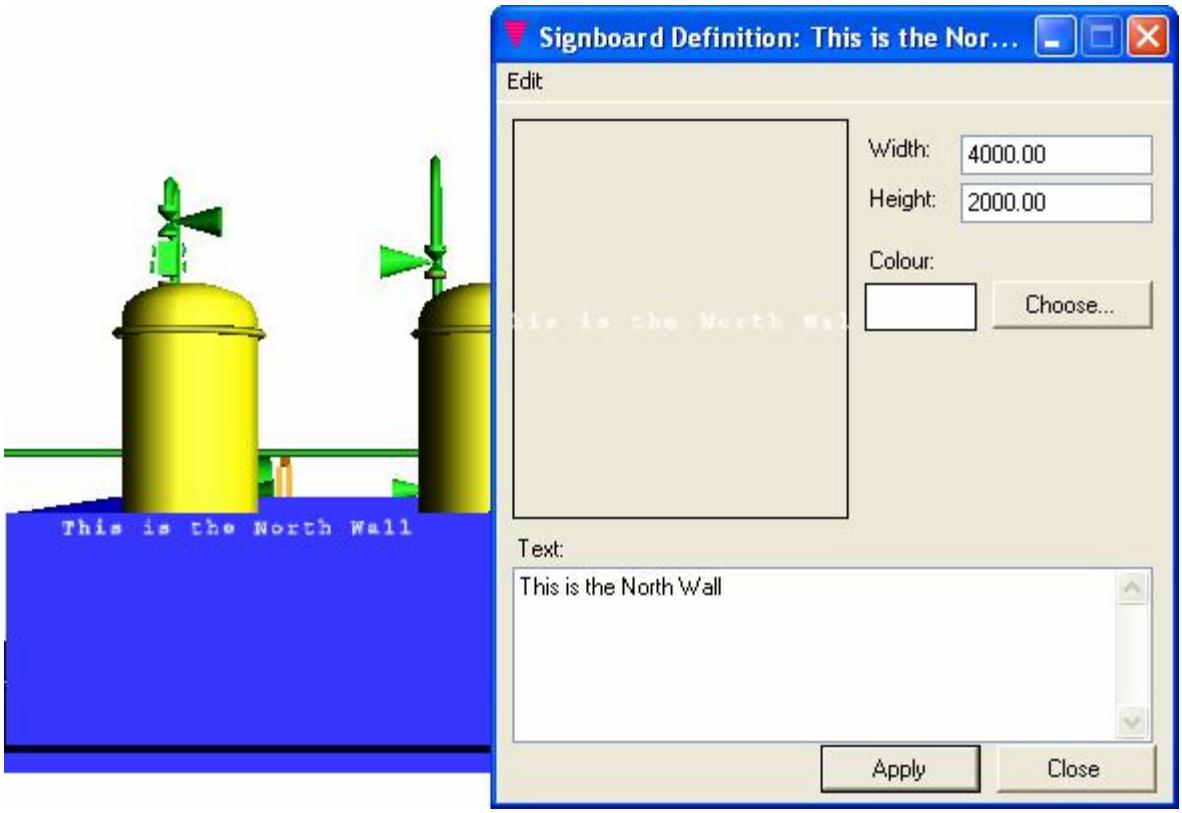
A *signboard* is a rectangular object, which can show any user-defined text or image on its surface, which you can add to the displayed model. You can position and orientate the signboard explicitly, or you can position it at the surface of an existing object in the model.

12.6.1 Creating a Signboard at an Explicit Position

1. First, pick an object in the **Observer View** at which you wish to position the signboard. Alternatively, select the object in the **Explorer**.
2. Select **Tools>Signboard>Create At…** from the main menu bar. You will see a **New Signboard** form on which you must enter a name to identify the new signboard. When you **OK** this form, you will see **Position Signboard At…** form.
3. On the **Position Signboard At…** form, enter the coordinates of the centre of the signboard. To derive this data from an existing object, pick-and-paste the object name into the text box near the top of the form and then **OK** the form.
4. Use the **Signboard Definition** form to define the text and background for the signboard.

12.6.2 Creating a Signboard at the Surface of an Existing Object

1. **Select Tools>Signboard>Create On Surface**. When prompted, pick a point on the surface at which you want to position the centre of the new signboard (the signboard will actually be positioned slightly in front of the picked surface, so that it is displayed clearly).
2. You will see a **New Signboard** form on which you must enter a name to identify the new signboard. When you **OK** this form, you will see a **Signboard Definition** form.
3. Use the **Signboard Definition** form to define the text and background for the signboard.



12.6.3 Defining a Signboard's Appearance

A signboard can include any user-defined text as its foreground and any predefined material (which can include a graphical image) as its background. To define these, select **Tools>Signboard>Edit**. You will see a **Signboard Definition** form whose title bar also shows the name of the current signboard (use the **Edit>Open** option to edit a different signboard if required).

1. Enter the signboard dimensions in the **Width** and **Height** text boxes.
2. In the **Text** area, type any text which is to be displayed on the signboard. To enter multi-line text, press **Return** at the end of each line; multi-line text always has centred justification.
3. Use the **Choose...** button to change the text colour as required, using the **Windows Colour** form.
4. To change the signboard background, select **Edit>Background>Set Material** from the **Signboard Definition** menu. Pick the required material from those displayed on the resulting form. The overall effect of the current text and background is shown in the graphical area near the top left of the **Signboard Definition** form If you do not set a background material (or if you use the **Background>Remove Material** option), the text appears to float in space or, more usefully, appear to be printed onto the surface of any object immediately behind the signboard.
5. To apply the form's settings to the current signboard in the displayed model, select **Edit>Save**. All data relating to the signboard is stored as a group.

12.6.4 Moving a Signboard

Since a signboard, with its associated text and background material, behaves as a group, you manipulate the signboard like any other group. To reposition or reorientate a signboard, select **Tools>Signboard>Edit** to show the **Signboard Definition** form, then use the **Position** menu options on the latter form to move the current signboard. The choices are as follows:

Option	Function
Edit>Position>Manipulation	Shows a **Signboard Manipulation** form which includes the same controls as those used to manipulate the scale man. Because you will often want to move a signboard by small amounts only, the step increment for moving a signboard is set independently of the global increment used for other manipulations. To change the step size for signboards, check the **Step** box. The maximum step size corresponds to the current translational increment for groups: you can change this, if necessary, by first selecting **Edit>Increments** from the menu on the **Group Control** form.
Position>Position At	Shows the **Signboard Position** form, enabling you to position the Signboard by typing in coordinates or by using the pick and paste facility.
Position>Position On Surface	Prompts you to pick a point on a surface where you want the centre of the signboard to be.

12.6.5 Editing a Signboard

Select **Edit>Open** from the pull-down menu on the **Signboard Definition** form to display an **Open Signboard** form listing all currently defined signboards. Select a signboard from the list and click **OK** to show its current data in the **Signboard Definition** form.

Edit the settings for the selected signboard's foreground text, background material, position and orientation, as required.

Option	Function
Edit>Save	Saves the new settings under the same signboard name, thereby updating the signboard definition, select.
Edit>Save As	Saves the new settings under a new signboard name, thereby creating a new signboard based on the existing one, select and enter the new name.

12.6.6 Deleting a Signboard

To delete an existing signboard, select **Edit>Open** from the pull-down menu on the **Signboard Definition** form, if necessary, to make it the current signboard, then select **Edit>Delete** to delete it.

13 Setting Up Animated Display Sequences

This chapter explains how you can create a sequence of views by moving the observer (or a light or a group) progressively along a predefined path. You can then play back this sequence to create an animation which shows the effects of this movement.

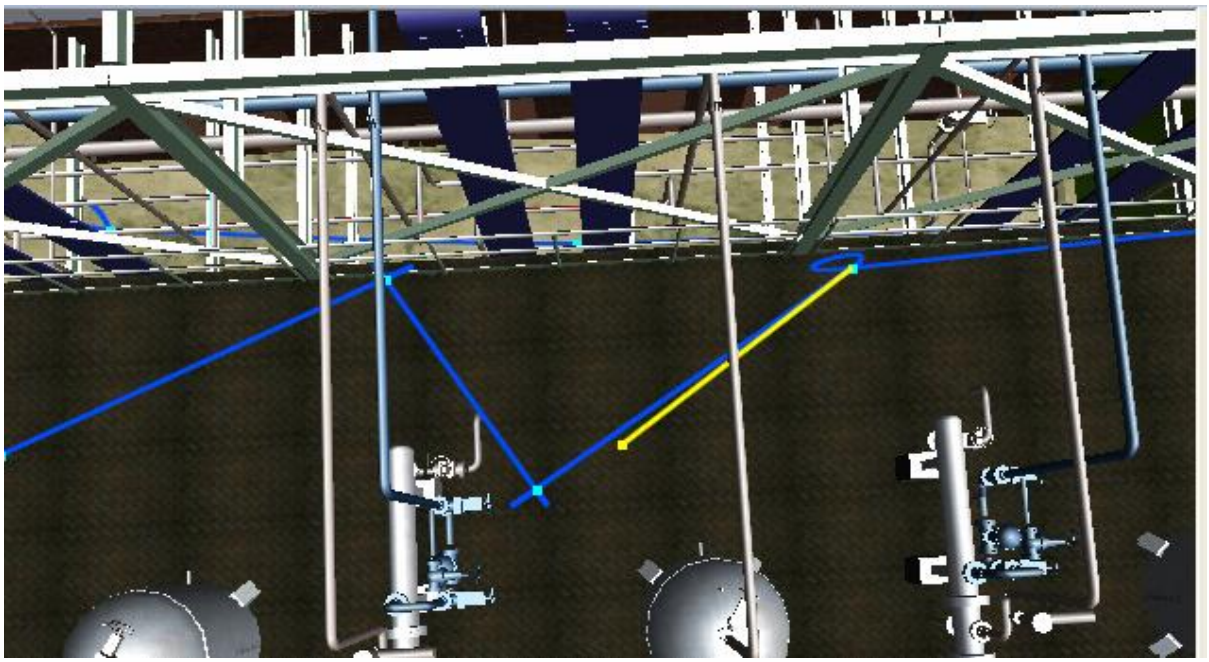
The steps to create an animated sequence are:

1. Define the object or group which is to be moved in a specific animation sequence. See Chapter 12 for details of working with groups.
2. Define one or more paths along which an animated object may be moved.
3. Play back the view sequence which would be generated as each specified object moves along its animation path, such that the **Observer** and **Camera Views** display the effect of the animation.

13.1 Defining a New Animation Path

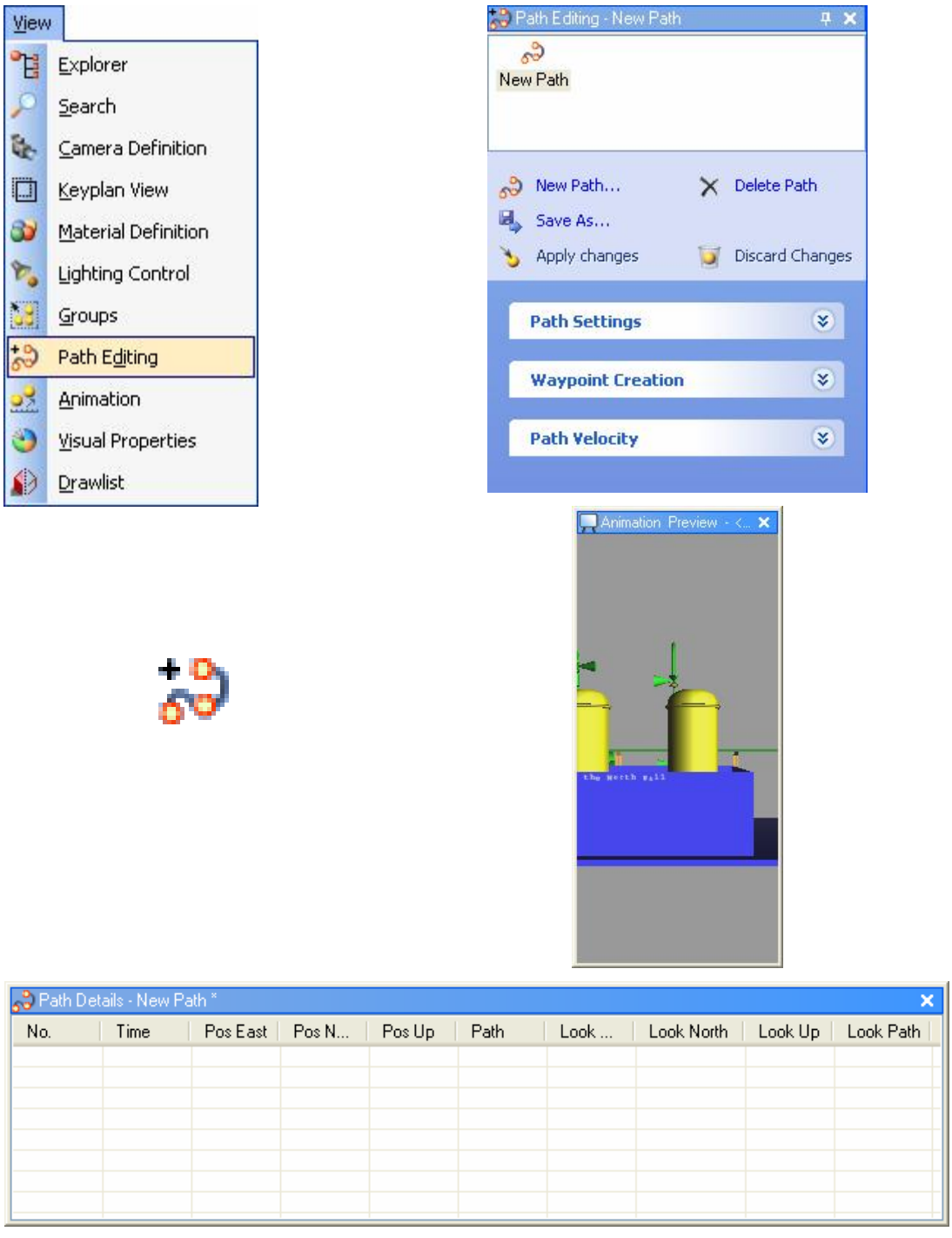
You define an animation path by specifying two or more points which correspond to the start and finish of the path and as many intermediate points as are needed to fix its shape. The actual path along which the animated object moves is interpolated between these points either *linearly* (giving a sudden change of direction at each point) or as a *spline* (giving a smooth transition from one Section of the path to the next).

As the animation path is defined, it is displayed in the **Observer View** – see below for an example:



The animation path is drawn as a blue line through the view with the waypoints drawn as light blue squares. It is possible to click on a point to select it. The currently selected point will have its point number and time displayed. The 'look to' point will be displayed with a yellow cross and the look direction of the waypoint will be displayed in yellow.

The **Path Editing** family of forms allows you to define and an *animation path*, An *animation* can then be played along the path – see Section 13.3.



To create a new animation path, click **New Path...** and enter the name of the path in the resulting **New Path** text box.

13.1.1 Defining a Path – Initial Settings

Before you start to define a path through the model, carry out the following steps:

1. Create a new path by clicking the **New Path...** link and providing a name for the path.
2. Bring up the **Path Settings** panel on the **Path Editing** form.

Option	Function
Show Path in Observer	Shows the animation path in the **Observer View** as you define it.
Show Waypoint Grid	Causes the **Path Details** panel to be displayed, giving the co-ordinates (and other attributes) of each waypoint to be displayed as it is created. Selection of waypoints in both the **Observer View** and the **Path Details** form is then synchronised so a point selected in the **Observer View** will be selected in the **Path Details** form and vice versa.
Show Preview Camera	Shows the **Animation Preview** window, which shows the view from the currently selected animation waypoint – see Section 13.2.1
Show Advanced Waypoint Creation form	Displays a form that contains advanced controls for creating waypoints – see Section 13.1.4.

13.1.2 Defining a Path Using the Observer View

Animation waypoints can be inserted directly into the **Observer View**. To define such a path, carry out the following steps.

1. Begin by specifying the initial walk **Path Settings** as detailed in Section 13.1.1. Ensure that the **Show Path in Observer** check box is selected. This setting enables the animation path to be shown in the **Observer View**.
2. Manipulate the **Observer View** until the displayed view is as you want it to appear at the start of the animation sequence.

3. Click **Waypoint Placer…** on the **Waypoint Creation** pane. To use the waypoint placer click an element surface in the **Observer View** to place an animation waypoint. The point will appear in the **Observer View** (as a blue triangle) as if a camera is placed at "person height" above the point on the surface clicked on. This allows for a quick definition of a walkpath by clicking on the points where the observer is to stand.

   Note: When using the waypoint placer to define an animation walkpath the look-to direction for waypoints will be kept updated to ensure that the camera is always looking along the path. Once the path is defined use the Locator handle to adjust the viewing direction at any of the waypoints

4. The definition of the point will be copied into the **Path Details** panel and the form will change automatically to allow you to define the next waypoint. The view through the camera at this point is shown in the **Animation Preview** window.

5. Repeat the preceding steps to define Point 2 at Time 1 second, and so on until you reach the end of the path. (Note: The term 'second' is used here to specify relative times only.)

6. Alternatively, use the **Track Position of Item** options to specify whether you wish to attach the path definition point to the active **Camera**, **Group** or **Light**. It is sensible, but not essential, to define the path using the object which will be moved along it during the animation sequence. (See also Section 13.2.6.)

7. To change explicitly an entry in the **Path Details** table, double-click on the entry. All normal Windows facilities can then be applied to the content of the entry. Double-clicking on a **Path** entry allows you to select **Spline** or **Linear**, depending on the type of transition which you want from the current point to the next.

Note: Each **Spline/Linear** option applies from the current point to the next. If you change this smoothing mode at an intermediate point, the apparent direction of motion of the observer will change sharply at that point during the animation.

When add-ing waypoints to the path with a set velocity the calculations for the timing of waypoints on tight corners will attempt to keep a smooth pace round the corner. For example, while cornering on a landing on a flight of stairs. It is possible to adjust the cornering speed by increasing or decreasing the velocity.

If the speed around a corner is too fast or too slow it is possible to adjust the speed of the cornering. In the **Path Velocity** pane select the range of waypoints for the corner and try different velocities over these points until the speed seems right. Note that it is also possible to play back the animation over only these points in the **Animation Controls** path – see Section 13.3. This makes it easier to check the speed of the corner.

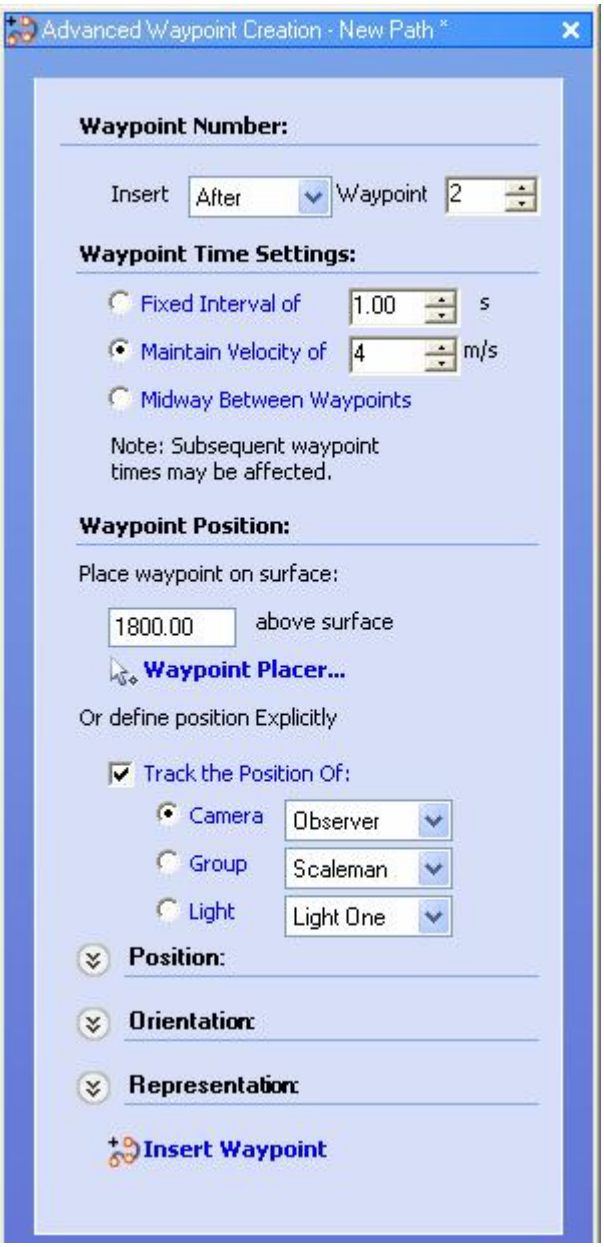
13.1.3 Saving an Animation Path

When you have completely defined the animation path, use the **Apply Changes** option in the top panel of the **Path Editing** form to name it and store it.

Note that these options store the path definition internally for the duration of your current Review session only; they do not save the definition in an external file.

To save the definition to an external text file, click **Export Points to File…** on the **Path Settings** pane. See also Chapter 14, which tells you how to save animation path data in status files.

13.1.4 Advanced Waypoint Creation



Waypoint Number

This Section of the form is used to identify the number that the waypoint will be given. Waypoints can be inserted **Before**, **After** or can even **Replace** a given waypoint on the path.

Waypoint Time Settings

The time settings that the waypoint will be inserted with are specified here. There are three ways to define the time:

Option	Function
Fixed Interval	Sets the time to be a fixed value from the time of the previous waypoint.
Maintain velocity of	Calculates the time setting of the waypoint using the specified velocity
Midway between Points	This option is used for inserting waypoints in-between two other waypoints. The time will be midway between the times of the previous and next waypoints.

Waypoint Position

Once the time setting is chosen the final thing to do is define the position. As with the **Waypoint Creation** panel on the **Path Editing** form there are different ways to do this.

Waypoint Placer

First there is the **Waypoint Placer**. This works in the same way as the waypoint placer from the **Path Editing** form. An extra feature for the advanced form is the ability to specify the height of the waypoint above the identified surface.

Track the Position Of:

As with the **Path Editing Waypoint Creation** pane, it is possible to define the waypoint position to be the same as a **Camera**, **Group** or **Light**. To do this:

1. Select the **Track the Position Of** checkbox.
2. Select the appropriate **Camera**, **Group** or **Light**.

Once the **Camera**, **Group** or **Light** is in the desired position click on **Insert Waypoint…** to insert the point.

When tracking an item the **Position:** and **Orientation:** panels give feedback on where the point will be inserted.

Enter Position Manually

It is also possible to define an explicit position. To do this:

1. Deselect the **Track the Position Of** checkbox.
2. Expand the **Position** panel and enter the **East**, **North** and **Up** values of the point
3. Expand the **Orientation** panel and enter the orientation as either a **Bearing**, **Elevation**, **Roll** or by using a **Look At Centre** position.
4. Click on the **Insert Waypoint…** link.

Path Representation

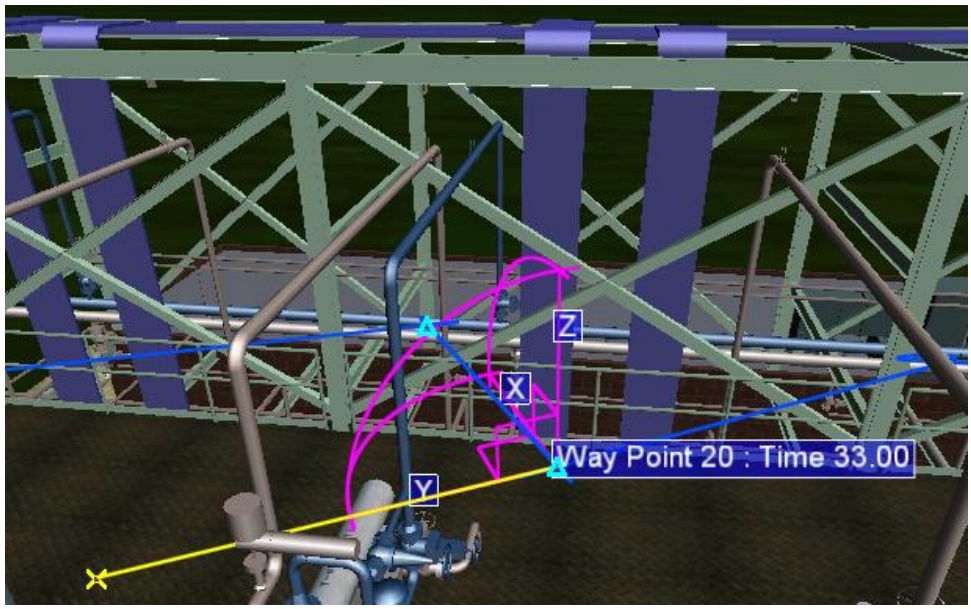
It is also possible to define whether the point is entered as a spline or linear path. Use the **With path representation:** option lists to specify a **Spline** or **Linear** path for the position and look to position.

13.2 Editing an Animation Path

To edit an existing path, select the path icon from the display at the top of the **Path Editing** form. Carry out one or more of the following editing operations and then save the modified path definition.

13.2.1 Manipulating a Waypoint

To enable graphical modification of waypoints, by select the **Allow Graphical Modification** within the **Path Settings** panel of the **Path Editing** form. The locator handle will appear on the selected waypoint. The locator handle will be oriented to meet the current orientation of the waypoint. See the illustration below for an example.



The locator handle can be used to reposition or reorientate the point, in a similar way to manipulation of Groups. See Section 12 for details.

To aid the visualisation of editing points, particularly when editing an animation path relating to a camera, the **Animation Preview** window will show the view through the camera at that point. An example of a view in this window can be seen below.

The view in the **Animation Preview** window will update automatically when the locator handle moves or rotates the waypoint.

Note: If the **Enable High Performance locator handle** checkbox on the **Preferences** form (see Section 12.3.7) is clear then the view will only update at the end of the drag with the locator handle. This setting is preferable for lower spec machines running large models.

Further actions can be carried out on individual waypoints using the **Actions for Point** pane:

Selecting a point in the **Path Details** panel and then clicking **Focus on Point** moves the **Observer View** near to the waypoint and orients the camera such that the waypoint is in the centre of the **Observer View**.

Selecting an item from the lists under **Snap Item to Waypoint:** and then selecting the appropriate option changes the position and orientation of the identified object to that of the waypoint.

13.2.2 Deleting a Waypoint

Select the waypoint you wish to delete in the **Path Details** pane, then click **Delete Point** in the **Actions for Point** pane.

Alternatively, select the required waypoint in the **Observer View** and select **Delete Waypoint** from the shortcut menu on the point.

13.2.3 Inserting an Additional Point

To insert an additional point, select the point in the **Path Details** panel (or from the Insert After Point list in the **Waypoint Creation** pane) after which you wish to insert the new point. Click on **Insert Waypoint**.

A new point will be inserted at a position derived from the Track Position of Item settings. The co-ordinates of the point can them be adjusted by double-clicking on the **Path Details** table entries, and entering new values as required.

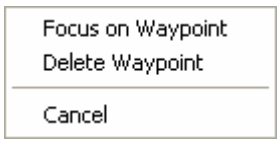
Alternatively, to insert an additional point via the **Observer View**, proceed as follows:

1. In the **Observer View**, click in the path (the light blue line) where the new point is to be inserted.
2. From the shortcut menu, select **Insert Waypoint**. The new waypoint will be inserted. If **Allow Graphical Modification** is selected in the **Path**

Settings pane, the locator handle will be displayed on the new point to allow the point to be manipulated as desired.

13.2.4 Shortcut Menus on Waypoints

The following shortcut menu is available over animation waypoints in the **Observer View**:



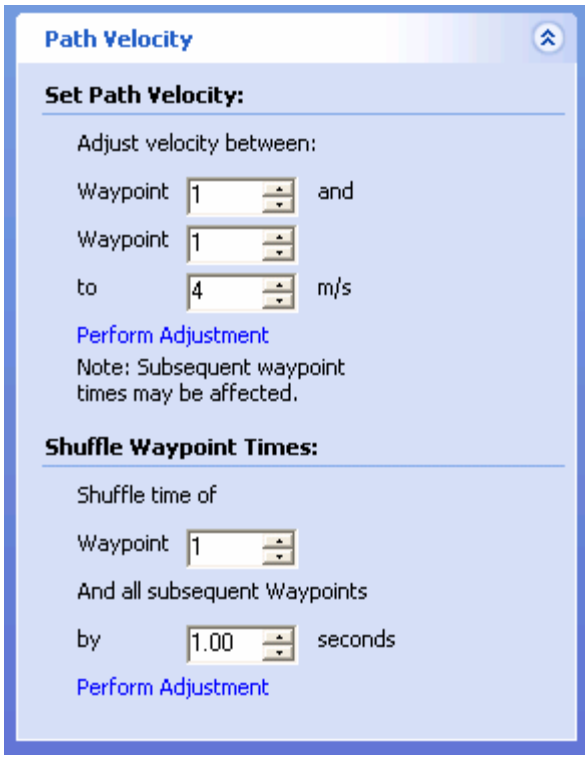
Option	Function
Focus on Waypoint	Moves the camera near to the waypoint and orients the camera such that the waypoint is in the centre of the **View**.
Delete Waypoint	Deletes the waypoint.

The following shortcut menu is available over animation waypoints in the **Path Details** grid:

Option	Function
Dynamic Focus on Waypoint	Dynamically moves the camera near to the *waypoint* and orients the camera such that the *waypoint* is in the centre of the **View**.
Focus on Waypoint	As above, but without dynamic movement.
Look at Waypoint	Reorientates the camera to look towards the identified element but with no movement of the camera.
Delete	Deletes the *waypoint*.
Bearing, Elevation, Roll	Sets the grid to display orientation in terms of *bearing*, *elevation* and *roll*.

Option	Function
Look at Centre	Sets the grid to display orientation in terms of **Look** position.

13.2.5 Adjusting the Path Velocity



The animation *speed* between any two points can be adjusted using the **Set Path Velocity** controls. Select the two points between which you wish to adjust the speed and click **Perform Adjustment**.

The speed between subsequent points *remains at its current setting*, and so the cumulative animation Time at each point will be adjusted accordingly. (The effect of this can be seen in the **Path Details** pane.)

The animation time between a set of waypoints can be adjusted using the **Shuffle Waypoint Times** controls. To shuffle the times by a given time offset select the start waypoint along with the required offset from the lists and click **Perform Adjustment**. This will shuffle the specified waypoint and all subsequent waypoints by the specified time offset. Note positive or negative values can be entered to increase or reduce (respectively) the animation times between the points.

13.2.6 Specifying Object-Path Animation Pairs

During the animation sequence, specified objects will be moved along predefined paths and the displayed views will be updated to show the effects as this movement takes place. Any valid type of object may be moved along any specified path, each object-path

combination constituting an *animation pair*. More than one object may share a common animation path.

The animated object may be any of the following:

- The observer
- Any group (including the scale man)
- Any light source except ambient (particularly effective when this is a local light)

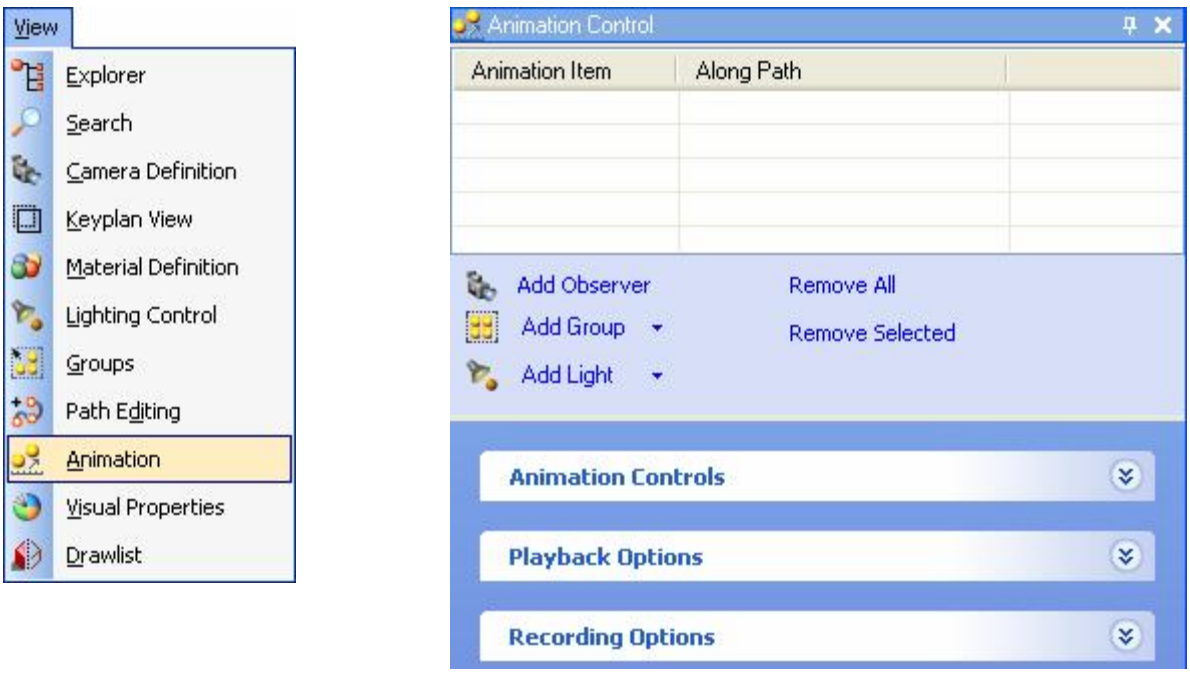
To specify which objects are to be moved during the animation sequence, select from the **Track Position of** Item controls on the **Waypoint Creation** pane.. Select the item to be animated from the displayed list of objects and the path along which it is to be moved from the displayed list of currently defined paths.

Note: Although a path may be associated with any camera, group or light, you will usually find it most useful if you define each path by using the appropriate object with which it is to be associated as an animation pair.

When you run an animation sequence, all animation pairs listed in the **Animation Status** form will be actioned simultaneously.

13.3 Running an Animation Sequence

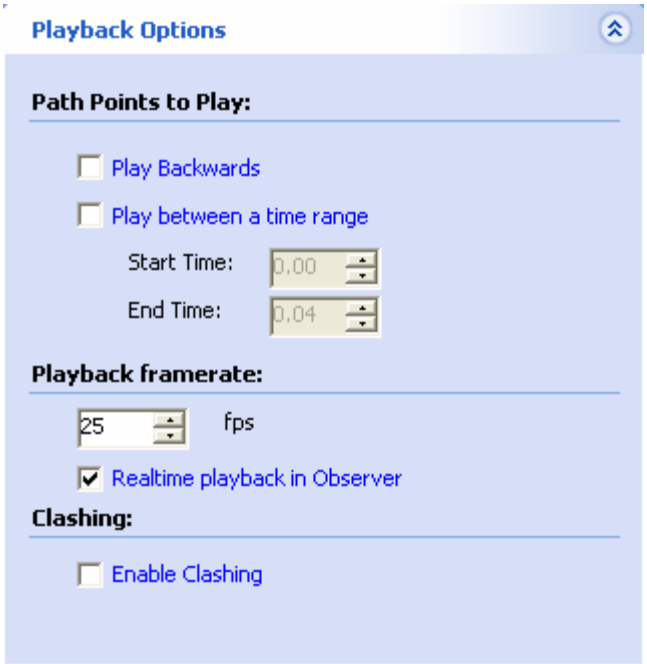
The **Animation Control** form allows you to play back a sequence of animation points along a previously defined path – see Section 13.2.



To run an animation sequence, first select from the top panel of the **Animation Control** form the object (**Observer**, **Group** or **Light**) that you wish to move along the path.

Clicking **Add Group** or **Add Light** allows you to select from a list of groups or lights. Having selected the object to move, clicking in the **Along Path** cell will produce a list of paths for you to select from.

13.3.1 Playback Options



An animation sequence will be played *forwards'* and from the start of the animation to the end, unless you change these settings from the **Play Backwards** and **Play between a time range controls**.

When you run an animation sequence, the animated objects will be moved along the defined paths and the views will be updated a predetermined number of times between each point on the path. By default, the view is updated 25 times between each pair of points so that, if the time interval between points is 1 second, the effective replay speed is 25 frames per second.

Note: Although all animation times in Review are indicated in seconds, the actual animation rate depends on the conditions under which the replay sequence takes place (particularly upon the speed with which the display can be redrawn on your workstation). You should regard these timings only as relative values rather than as actual elapsed times.

Normally, the video will be played as quickly and as smoothly as possible, regardless of the waypoint time settings. If you wish to play the video using the preset waypoint timing settings, select **Realtime playback in Observer** in which case the total animation time will be exactly that defined for the path.

To change the number of view updates between each pair of points on the path, enter the required framerate in the fps text box.

13.3.2 Running the Animation

Use the following controls to stop and start the animation sequence as required:

Button	Function
	Runs the complete sequence once, from one end of the path to the other.
	Runs the sequence repeatedly, so that when the animated object reaches one end of the path it jumps to the other end and starts again.
	Stops the animation and displays the current frame. Click **Play >** to continue from the point at which you paused.
	Moves the display sequence on to the next frame when in Pause mode. This allows you to step through the sequence frame by frame for a detailed observation of particular parts of the model.
	Returns to the start or end of the animation sequence, depending on whether you are in **Forward** or **Backward** playing mode.
	Records the animation to AVI file or bitmap frames (see Section 13.3.5).

13.3.3 Showing Clashes

To carry out continuous clash detection throughout the animated display, select the **Enable Clashing** check box on the **Playback Options** pane.

All clashes encountered by animated groups during their progression along their paths will be shown by highlighting the clashing items. (This is equivalent to switching clashing on temporarily for every group; but note that groups are not clash-checked against each other.)

13.3.4 A Shortcut for Starting and Stopping Animations

To run an animation sequence without opening any animation forms, simply press the **F5** function key while the pointer is in the **Observer View** window.

The animation sequence uses the animation path which is currently selected in the **Path Editing** form and will run using the current settings from the **Animation Control** form. (You must, of course, have previously defined at least one animation pair.)

To pause the animation, press the **F5** key again. Repeated use of this key alternately stops and starts the animation.

To stop the animation completely, press the **Esc** key.

13.3.5 Recording an Animation Sequence to a Set of Files

The **Recording Options** panel provides settings to use when recording animations. Options include whether to save to AVI file, bitmap frames or both, what screen size to use and the compression settings.

Saving to AVI file

To save to a digital AVI file select **Save to AVI file** and enter the name of the file in the text box. When the button is pressed on the **Animation Controls** panel Review will start recording the animation direct to the AVI file.

To specify the compression to use in the AVI select a compression codec from the **Compression** option at the bottom of the form. The options in this list reflect the codecs installed on the computer running Review. If the codec has properties that can be set the **Properties…** link will be available; clicking on this link displays the property page for the codec.

Saving the Individual Frames

It is also possible to output the animation as a set of bitmap files containing each frame. To do this select **Save Frame Images** and specify a name prefix in the Frame image prefix text box. Also choose a file format type from the file extension drop down menu. Frames will be saved with names (for example), **Frame0001.bmp**, **Frame0002.bmp** etc.

Specifying the Frame Size

The **Frame Size** section of the panel allows for setting of the resolution of the animation in pixels. It is possible to select a custom size or choose one of three pre-set image sizes (**PAL**, **NTSC** and **Fullscreen**).

Oversampling

Oversampling enables a higher level of detail to be used when creating the animation. Select the **Enable Oversampling** checkbox to produce high-fidelity animations.

Exercise:

Open the **Path Editing** form and define a new animation path through the displayed model. (Use the **Group>Scaleman** option and use Spline mode for all points.) Set three points first, and then insert a fourth point between the first two. Note how the point numbers and times are set automatically. Add more points to the path if you wish and then store the path definition as, say, Path 1 (note that names may include spaces).

Use the **Add Group** option on the **Animation Control** form to add the scale man to Path 1. Ensure that the scale man is made visible in the **Observer View** (**Tools>Scaleman>Make>Opaque**).

Open the **Animation Controls** panel and click . Notice how the display shows the progression of the scale man along your defined path. Pause the playback ( ) button)and select **Play Backwards** in the **Playback Options** pane. Click again. Use the buttons to look at two or three individual frames. Notice how the animation path is displayed when you pause the playback.

Run the sequence again with **Enable Clashing** selected and watch what happens if the scale man (who now has his own limits box) hits the model.

Now dismiss/close the **Animation Control** and **Path Editing** forms and run the animation sequence again by using the **F5** key, pausing the animation once or twice during its duration.

14 Widescreen Review

14.1 Introduction

A widescreen facility is provided which allows two or three sessions of Review to be linked together to present an image with a wide field of view (e.g. 120º). This facility allows Review to be used in Virtual Reality Theatres running two or three networked of a similar type. Typically the images would be projected onto a screen and may be passed through special video processing equipment to seamlessly blend the edges of the images together.

14.2 Setting Up

The required geometry of the views in each of the Review sessions changes with the system used to display the widescreen image. For example, the screen may be curved or a single flat surface. They geometry of the projector system and the screen(s) must be considered and any video edge blending equipment would require the images at the blended edges to overlap.

The control of the geometry of each of the Review sessions in widescreen mode is provided through environment variables which directly or indirectly determine such parameters as view direction, field of view, skew of view and view overlap. These environment variables are set by the special scripts that will need to be customised for each widescreen setup. There may be extra help in setting these variables in the scripts themselves but some of the variables and their effects are briefly described below. Whatever the setup, one of the Review sessions is in control: the Master. If running three Review processes, then the Master is the one providing the centre image and the Slaves are on the left and right. All user navigation is achieved through interaction with the Master, which controls the Left and Right Slaves. In widescreen mode the views in the left and right Slaves can either share the view direction with the master and be skewed from the Master's or can each have a separate view direction rotated outwards from the Master's.

14.3 Environment Variables

Environment Variable	Description
RVR_WIDESCREEN_MODE	If this variable is set the Review jumps straight into widescreen mode. This is best left unset until a working setup has been arrived at.

Environment Variable	Description
RVR_WIDESCREEN_CHANNEL id	Where *id* is master, left or right for the Master, left and right Slaves respectively.
RVR_WIDESCREEN_MASTER_HOST hostname	Where *hostname* is the host name of the computer on which the master will be running.
RVR_WIDESCREEN_NUMBER_SLAVES 1 or 2	Informs the Master of the number of Slaves that will be connecting to it
RVR_FRAMERATE fps	Sets Review's default animation frame rate to fps
RVR_WIDESCREEN_MASTER_FOV fov°	Where *fov°* is the *master* field of view as indicated in the figure for single view direction configurations – see Figure 14-1and Figure 14-2 below
RVR_WIDESCREEN_OUTER_FOV fov°	Where *fov°* is the *outer* field of view as indicated in the figure for single view direction configurations – see Figure 14-1and Figure 14-2 below
RVR_WIDESCREEN_INNER_FOV fov°	Where *fov°* is the *inner* field of view as indicated in the figure for single view direction configurations – see Figure 14-1and Figure 14-2 below
RVR_WIDESCREEN_SCREEN_OVERLAP overlap	*overlap* at the abutting edges [0.0, 1.0]
RVR_WIDESCREEN_ROTATE_VIEWS	If this variable is set the following variables are used to set the fields of view and the view rotations for the Master and the Slaves; (the outer, inner and master fields of view are ignored). See the figure for separate view direction configurations – see Figure 14-1and Figure 14-2 below.
RVR_WIDESCREEN_HORIZFOV fov°	Where *fov°* is the field of view as indicated in the figure for separate view direction configurations – see Figure 14-1and Figure 14-2 below.
RVR_WIDESCREEN_VIEWROTATION rotation°	Where *rotation* is the view rotation for the separate view direction configurations – see Figure 14-1and Figure 14-2 below.

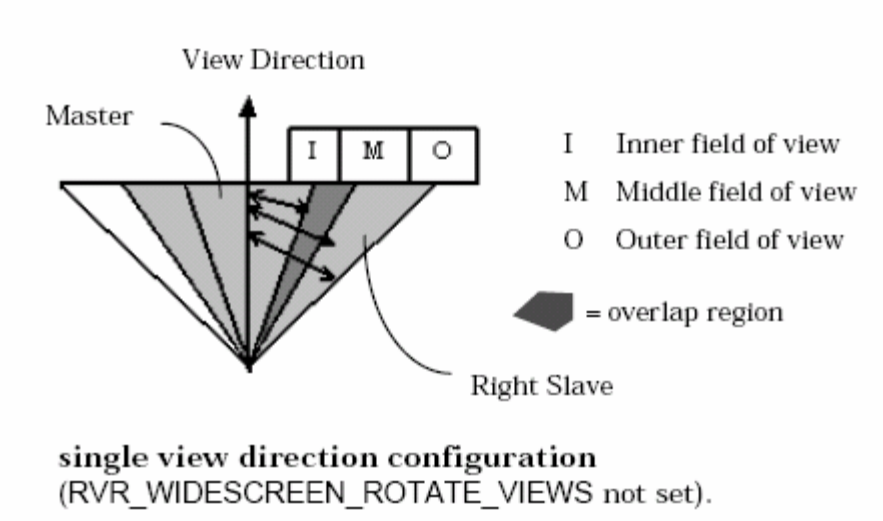


Figure 14-1: Single View Direction Configuration

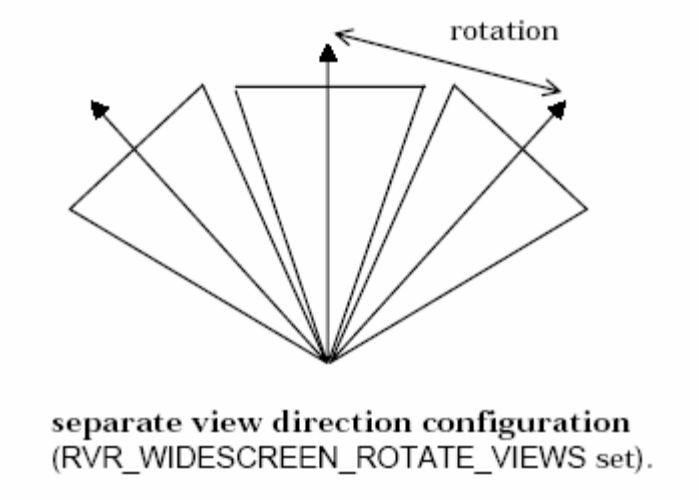


Figure 14-2: Separate View Direction Configuration

14.4 Running Review in Widescreen Mode

There are three major scripts for running Review in widescreen mode: WDMASTER, WDLEFT and WDRIGHT and they use another script WDENV for setting up their common environment variables. Command line arguments normally given to Review can be given to these scripts.

The golden rule for running Review in widescreen mode is that the Master *must* be running in widescreen mode before the Slaves. If the variable **RVR_WIDESCREEN_CHANNEL** is set, then a Widescreen entry is added to the Options pull-down menu of the **Observer View**. Remember that if the variable **RVR_WIDESCREEN_MODE** is set then Review goes straight into widescreen mode. It is suggested that this is left unset and that the Widescreen Mode menu option be used to put each of the Master and Slaves into widescreen mode.

Once all the review Master and Slaves are up and running then the Master should be put into widescreen mode first, followed by the Slaves. The **Observer View** on the Master will not be refreshed until the Slaves synchronise with the Master. If a Slave is put into widescreen mode before the Master then it will never synchronise and the Review processes will have to be restarted.

The Master can drop out of widescreen mode if the **Esc** (escape) key is pressed in the Master's **Observer View**. By using the menu option as before, the Master can be put back into Widescreen mode and the Slaves will re-synchronise.

Once the Slaves have been put into widescreen mode, they cannot be removed from this mode until the Master session has been terminated.

It should be obvious that each of the Master and Slaves should load the same model and status files, although some interesting effects can be achieved with minor status file modifications; (by altering the drawing representation in a Slave to wire-frame for example).

The frame rate in widescreen mode will be affected by the speed of the network and the performance of the graphics cards on the Master and Slaves. The graphics cards in the host computers should be as comparable as possible.

Note that Review animations may be run in the Master (but that groups will not be animated in the Slaves) and that Voyager may also be used when Review is in widescreen mode (linked with the Master).

14.5 Quad Buffer Stereo and Widescreen

If you have NVIDIA Quadro FX3000G graphics cards in your Master and Slaves and suitable stereo hardware, quad buffer stereo can be used in conjunction with widescreen mode. Each machine will need to be correctly configured to allow quad-buffer stereo (See Section 15).

14.5.1 Hardware Setup

Daisy chain the graphics cards together using a standard CAT5 patch cable plugged into the external RJ45 connector. You can connect any of the two RJ45 connectors located on the graphics card bracket; each connector automatically configures itself as an input or output after all the connections are made. A flashing green LED indicates an input and a flashing yellow LED indicates an output.

Designate one of the cards (most probably the Master) to be the server device: Open the **Windows Display Pro**perties control panel and click **Settings > Advanced** to navigate to the NVIDIA graphics display properties page. Click the **Frame Synchronization** tree item from the slide-out try. Check the **Treat this system as Server** checkbox.

The other two cards need to be designated as clients. Follow the same dialog as above on the Slaves, check the **Treat this system as Client** checkbox. It is essential that the Refresh rate selected on this screen is the same on all the machines in use.

When starting Review, ensure -qstereo is specified on the command line, and ensure you enter Stereo mode from the **Observer > Options** menu before entering widescreen mode on the Master and the Slaves.

15 Quad Buffer Stereo

In order to view stereoscopic images with review, you will need a graphics card that supports quad buffer stereo and display hardware that can decode such images. To enable stereo mode, ensure Quad Buffer Stereo is enabled on your graphics card. When starting Review -qstereo must be specified on the command line. To switch to stereoscopic mode, select **Options > Stereo > On** from the **Observer View** menu.

To change the distance between the effective eye points from which the stereoscopic image is derived, thereby changing the apparent depth of the 3D effect, select **Options > Stereo > Separation** and enter the required separation distance in the displayed form.

To revert to non-stereoscopic mode, select **Options > Stereo > Off** from the **Observer View** menu.

16 Saving Review Settings to Files

Review provides facilities for exporting some or all of its settings to the following types of data file:

- A *status file* is a binary file which holds display configuration settings from one Review session.
- A *textual report file* is an ASCII file which holds the same display configuration settings as a binary status file, but in a user-readable format.

You can also save the content of the **Observer View** display as a *picture file*. This is a bit-mapped image file, in the default format for your workstation, which you can load into any suitable graphics program for modification and/or printing.

16.1 Creating a Review Data File

To save any of your current Review settings to a data file, click the **Save** button on the toolbar. An **Export Review Status File** form will be displayed.

Create the required type of file as follows:

1. The **Export Review Status File** form uses the standard **Windows Save** dialog box. Navigate to the directory which is to contain the data file.
2. Select an existing data file from the list if you wish to overwrite it, or enter a new file name in the **File name**: text box.
3. If you wish to add text to, or modify, the file note associated with the data file (so that the note may be read back when a binary status file is reloaded, or included in the header of an ASCII file), click the **Edit File Note** button on the **Export Status Data** form (**File>Save Selection...**) and enter your text on the displayed form.
4. Ensure that the **Save as type** option list is set to the type of data file which you wish to create, namely Review **Status File** or **Textual Report**.
5. To save all available data in the format applicable to the specified type of file, select **Save All Data** on the **Export Status Data** form and click **OK**.
6. To save selected data only, select **File>Save Selection...** from the main menu bar. The **Export Status Data** form will be, allowing you to specify which aspects of the current Review configuration you wish to save in the file.

Use the **Export Status Data** form as follows:

1. For each of the following item types, you may select which ones are to be saved:

Item Type	Description
Cameras	Observer, Camera One, , Camera Seven.
Lights	Ambient, Light One, Light Seven.
Materials	Material definitions.
Paths	Animation paths.
Animations	The current animation status combinations of animated object and path.
Groups	Scaleman plus any user-defined groups.
Clip Volumes	Any user-defined clip volumes.

2. Select the relevant type of item from the list and then click **Select** to see a list of available items of that type. Highlight the ones which are to be saved in the status or report file.
3. Check one or more of the **Labels**, **Tags**, **Preferences**, **Keyplan State**, **Material Changes**, **Visibility Changes**, **Autotagging Changes** and **Signboards** check boxes if you wish to save the corresponding data. (Any options for which there is no data available for saving will be 'greyed out'.)
4. Click **OK** to create a status or report file containing the specified settings.

16.2 Reloading a Status File

You load a status file by using the **Import Status Data** form (select **File>Open Selection>Status File…**). Configuration settings thus loaded will be applied immediately to the current session.

If you load more than one status file in a single Review session, the resulting configuration will be a composite of the settings in each file. You might, for example, save all camera settings in one status file, all lighting settings in another status file, and so on. If you load a status file which includes settings which conflict with those already loaded from an earlier file, you will be asked if you want the new settings to overwrite the old ones for some types (clip volumes, groups, paths and animations), while for other types (such as materials) the old settings will be overwritten automatically.

16.3 Saving a Picture File

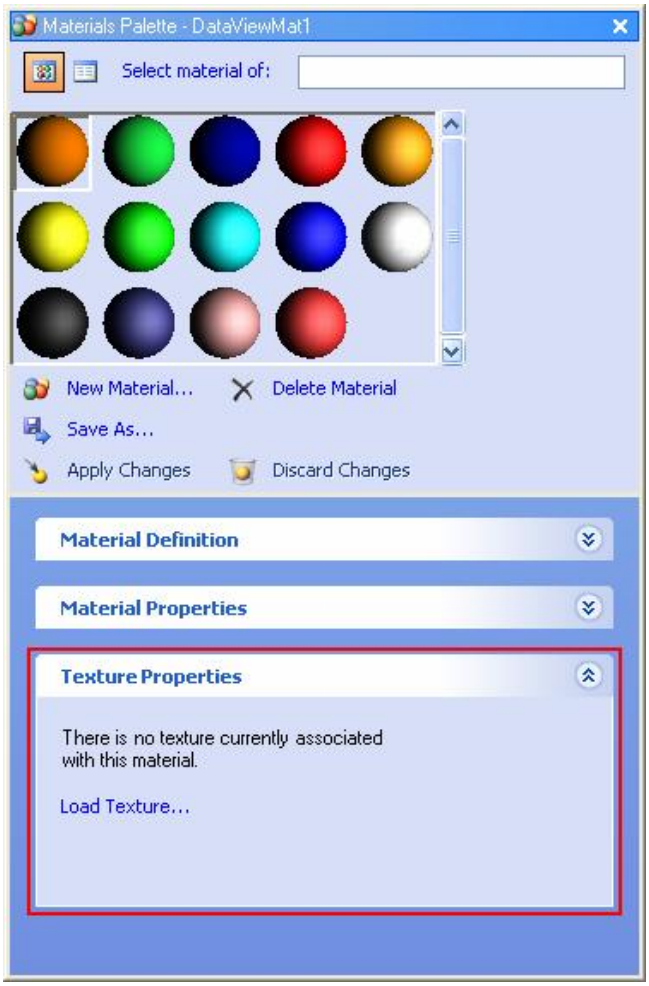
You can save the content of the current **Observer View** as a bit-mapped image file in the default graphics format of your workstation. Such a file will contain data defining the whole of the displayed model image, but will exclude the borders (title bar, menu bar etc.) of the **Observer View** window. To create a picture file:

1. Select **Tools>Options>Picture File** from the main menu bar. A **Save Picture File** form will be displayed.
2. Navigate to the directory in which you wish to save the file and enter the file name in the **File name** text box.
3. To save the content of the **Observer View** at its currently displayed size, set the option list to **Save Observer View**.
4. To save the content of the **Observer View** at the maximum possible size, set the option list to **Save fullscreen**.
5. To produce a better quality picture when plotted, use one of the options **Save 2X fullscreen** or **Save 4X fullscreen**. These options effectively save the content of the **Observer View** at a greater resolution than the screen resolution, giving finer grained plots.
6. Click **OK** to create the file.

17 Texture Mapping

Bitmap images can be wrapped onto surfaces to produce a realistic appearance. For example, a picture of bricks applied to a flat upright box would represent a brick wall. You can use the texture images supplied with your hardware, or you can create your own using the texture creation utility on your hardware.

The larger the texture image, the better defined it will be when viewed closely. However, large texture images use valuable memory and reduce performance, so textures should be kept as small as possible. Texture images larger than 512 x 512 pixels will be scaled down automatically when read into Review.



17.1 Creating Textured Materials

To create a textured material, select **Load Texture...** from the **Texture Properties** panel on the **Materials Palette** form. The **Open Image File** form will be displayed. Navigate to the required image file, and the image will be displayed within the **Texture Properties** panel

17.2 Using Greyscale Images

It is recommended that you should use a grey-scale image to improve performance and give lower memory requirements. For example, use a grey-scale image of a brick wall applied over a brown-red base colour to approximate red brick. If the file you have selected is grey-scale anyway, the **Load As Greyscale** check box on the **Open Image File** form will be selected automatically. If you have chosen a coloured image, select **Load As Greyscale** yourself. When you click **OK**, the image is *tiled* onto the image on the **Texture Properties** pane. If you have loaded a coloured image, you will see that the texture image colour is modulated by the base colour: to see the original texture colour use a base colour of white.

17.3 Controlling the Size and Shape of a Tile

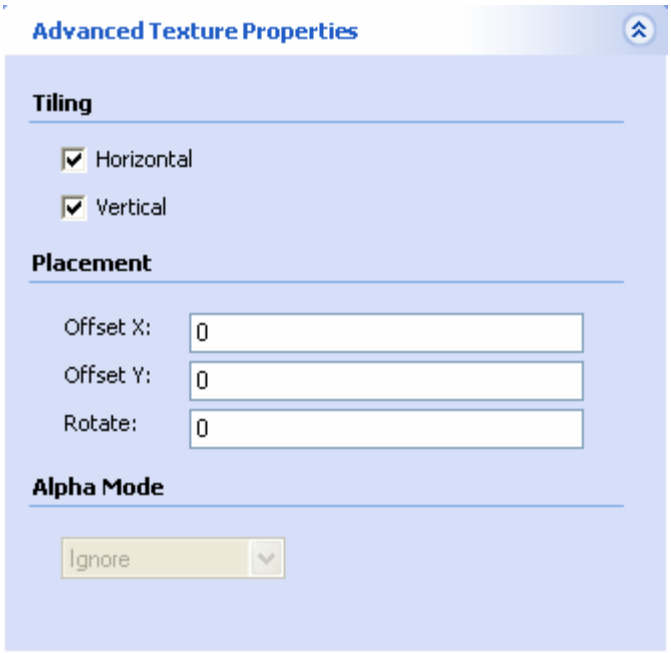
The primitives shown on the **Materials Definition** form have a major dimension of 1 metre, that is:

- a *box* 1m x 1m x1m
- a *sphere* with diameter 1m
- a *cylinder* with height and diameter 1m
- a *dish* (hemisphere) with diameter 1m
- a *cone* with height and base diameter 1m

By default, when a texture image is tiled onto a primitive, it is 1 metre (39 inches) wide. The height of the *tile* (that is, a single texture image) is proportional to the height of the original image. The tile width and height (in millimetres) are shown in the text boxes on the **Texture Properties** pane.

Having loaded a texture file, you can change the tile size and shape using the **Width** and **Height** text boxes on the **Texture Properties** pane. Note that if the **Keep Tile Shape** box is selected, changing either the **Width** or **Height** will change the other dimension automatically; if the **Keep Tile Shape** box is clear, the tile will be distorted.

17.4 Controlling How Tiles are Positioned and Repeated



The **Advanced Texture Properties** panel on the **Materials Palette** form allows you to control how tiles are placed on the primitive.

There are two *tiling directions*: Horizontal and Vertical. If you use a box primitive, by default the texture will be tiled onto the primitive with the bottom left corner of the pattern at a bottom-left corner of the box. Because both the default width of the pattern and the side of the box are 1 metre, the pattern will exactly map in the horizontal direction. Assuming the height is not 1 metre, the pattern will be repeated (or truncated) so that it covers the height of the box.

The **Offset** is given as a fraction of the dimension of the tile. For example, if you set an offset of 0.5 in the horizontal direction, the bottom left corner of the tile will be positioned in the middle of the bottom edge of the box.

By default, texture images are tiled over the entire surface of a primitive. You can switch off texture tiling in the horizontal and/or vertical directions, so that only one tile appears in the given direction, using the buttons to the left of the horizontal and vertical text boxes. Note that if you are using a texture as a decal, you can use an *alpha mask* and the *stick-on* option, see below.

The texture may also be rotated about its origin (lower left corner) through a given angle (in degrees).

17.5 Applying Textures to the Model

Note that textures are only shown on the model if the **Texturing** box on the **Image Quality** form (**Edit>Image Quality**) is selected.

Exercise:

Using the box primitive, load a texture. Size the tile and switch pattern repeating off so that a single pattern is mapped onto the centre of each face of the box.

17.6 Switching Textures On and Off

You can switch texture display on or off by selecting Draw Texture on the **Texture Properties** panel of the **Material Palette** form. Note that this only affects whether the texture is shown: it remains a part of the material definition. If you switch the texture off and then save the material, the texture will not be displayed in the model, but switching the texture on again will show it.

17.7 Removing Textures

You can remove a texture from a material by selecting **Remove Texture** from the **Properties** panel of the **Material Palette** form. This will delete the texture from the current material definition. You can recover the texture by clicking Discard before you save the material, but once you have removed the texture and saved the material the texture is lost.

17.7.1 Specular Textures

Using a primitive with curved surfaces, for example a cylinder, load a texture and then see the effect of increasing the **Specular** parameter on the **Material Properties** pane. In general, the parameter will have little effect: to increase the shininess of a textured material, select the **Specular Texture** check box on the **Texture Properties** pane.

Note that add-ing specular textures will slightly decrease performance.

17.8 Environment Map

The **Environment Map** check box on the **Texture Properties** panel is used to create the effect of reflections from a very shiny surface. Load a suitable texture, for example an image of a scene, and use the cylinder primitive. Set the **Specular** slider to maximum on the **Material Properties** pane.

17.9 Advanced Textures

You can add an *alpha mask* to a texture before you load it by checking the **Generate Alpha Mask** button on the **Load Texture Image** form. Note that some texture images are defined with an alpha mask. An alpha mask is used to make part of the texture transparent. Normally, the top-left colour in the texture image will be made

transparent. Wherever this colour appears in the texture image, the alpha mask will make the colour transparent when the texture is applied to a primitive.

If you check the **Invert Generated Masks** box on the **Load Texture Image** form, all pixels with the same colour as the top-left pixel will be visible and all other colours invisible.

A texture with a mask can be used in three different modes, as selected from the **Alpha Mode** option list on the **Advanced Texture Properties** panel of the **Materials Palette** form:

- By **Ignoring** the mask, the texture will behave as any other.
- The **Cut out** option makes the underlying primitive invisible where the mask is not set.
- The **Stick on** option allows the underlying material colour to show where the mask is not set.

The **Cut out** option can be used to put holes in surfaces to represent gratings etc.; the **Stick on** option can be used to stick a texture image as a decal onto a surface.

17.10 Examples of Simulating Real Materials

There are a number of texture image libraries available commercially. Note that the effects on the screen will be very much better than those shown in the manual.

Creating a Material That Looks Like Shiny Wood

1. Set a suitable material colour.
2. Load a texture that looks like wood.
3. Change the tile size if you want to control the grain size.
4. Increase the shininess and smoothness, and check the Specular Texture box on the Texture Properties panel of the Materials Palette form.

Figure 17-1: A shiny wood effect

Creating a Material That Looks Like a Grid

1. Load a texture that looks like a grid.
2. Select the **Generate Alpha Mask** check box and the **Invert Generated Masks** box on the **Open Image File** form.
3. Set the **Alpha Mode** option list selection on the **Advanced Texture Properties** panel of the **Materials Palette** form to cut out.

Figure 17-2: A grid effect

Creating a Material That Looks Like Chromium Plate

Load a texture that represents a scene, or one that has a mixture of colours. Increase the shininess and smoothness, and check the **Environment Map** button on the **Texture Properties** panel of the **Materials Palette** form.

Figure 17-3: A chromium plate effect

17.11 Using Old Model and Status Files

When a Review 3 model file is read into a later version of Review, the later version will create a material for each Review 3 material reference number found. Each material will be given a name of the form Material*nn* where *nn* is the number of the Review 3 material. For example, Review 3 material 7 will be created as Material07.

Old status files that reference numbered materials will cause materials to be created in later versions of Review if they do not already exist, alter their properties according to the data in the status files, and apply them to the model according to the material changes in the status file. Thus all pre-Review 6 model and status files should produce

a model indistinguishable from the model as loaded into Review 3 or later visions. This not true the other way round

The Review applications interface will cause materials to be created and altered in a similar manner.

18 The Data Viewer

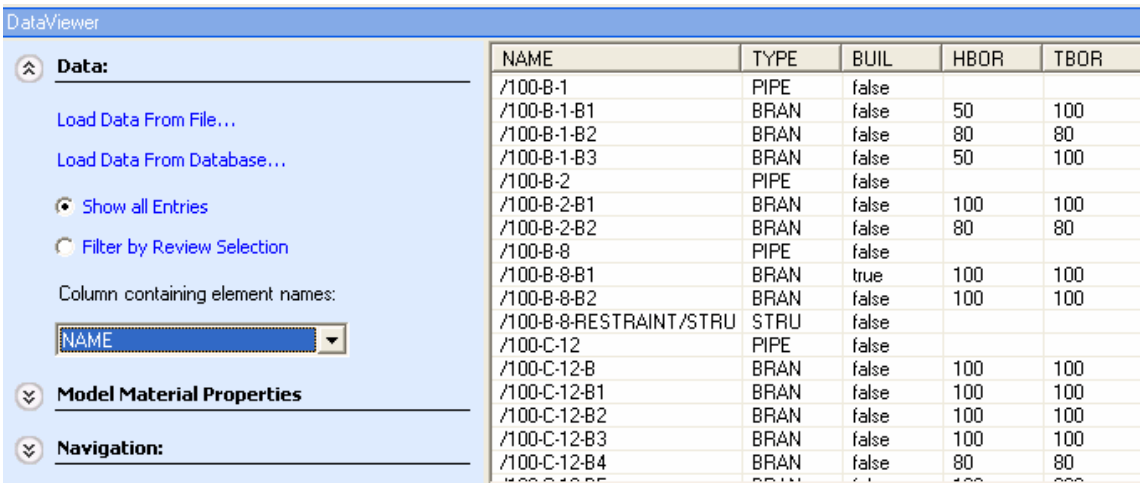
The **Data Viewer** provides a way of viewing PDMS attribute data for Review model elements. The Data Viewer can read data from two types of data source; text (.txt) files that have been created using the reporting facilities in PDMS or a SQL database.

Using the **Data Viewer** it is possible to navigate to elements in Review or set their material representation. An example of using the **Data Viewer** would be to colour code elements in Review to reflect build status.

Data Viewer is an example of an add-in. The add-in facility provides a mechanism whereby users can create their own sub-applications to add to Review.

18.1 Using the Data Viewer

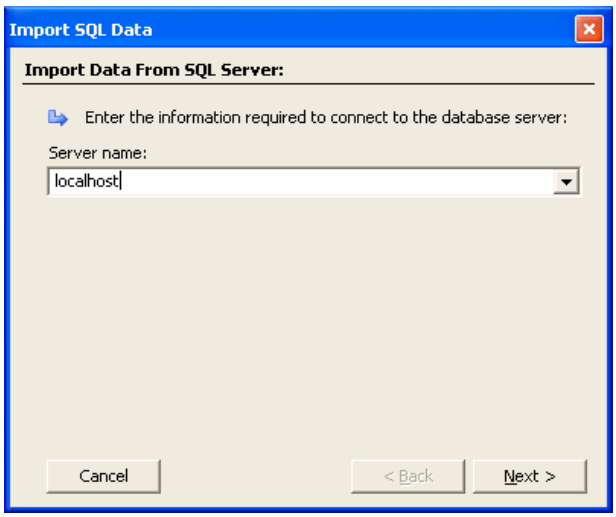
To open the Data Viewer select **DataViewer** from the **Addins** menu. This opens the **Data Viewer add-in** as a docked window in the Review main window.



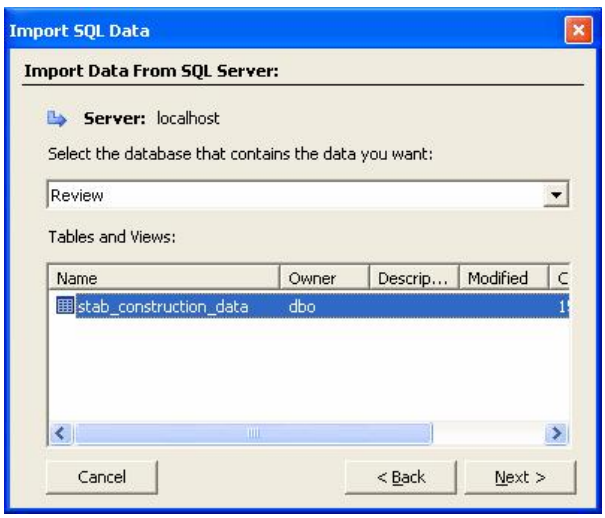
18.1.1 Loading and Displaying Attribute Data

To load data from a text file click on **Load Data from File...** .This displays the standard windows file selection dialog. Use this dialog to identify the file to open.

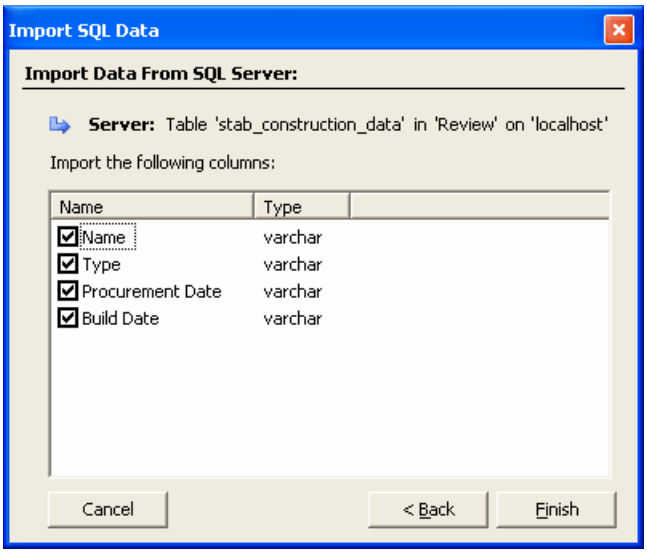
To load data from a SQL database click on **Load Data from File…** this displays the **Import SQL Data** dialog.



Select the name of the server that contains the SQL database you wish to import data from and click on **Next >**. This brings up the next page of the form that allows you to identify the database and table to import from.



Select the appropriate database and table from this page and click **Next >** to continue. The final page allows you to choose which columns to import from the table.



Identify the columns you want to import by clicking on the checkboxes and click **Finish** to import the data.

Note: Some sample SQL Data for use with the stabilizer model is provided on the Review Install as an example.

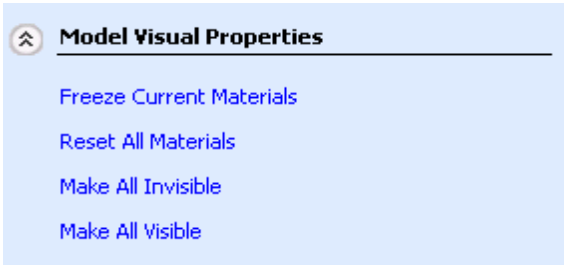
Once the data is imported into the Data Viewer there are two ways to view it, these can be selected using the following option buttons:

Button	Function
Show All Entries	Displays all of the data that is loaded into the viewer.
Filter by Review Selection	Show only the data that relates to the elements that have been selected in Review. This tracks the selection in the currently active window in Review and show any data that has been imported for those elements.

One of the columns in the imported data must contain the names of the elements the data relates to. The combo box **Column** containing element names will be populated with the column titles. Use this to identify the column that contains the element names.

18.1.2 Modifying Visual Properties for the Entire Model

The collapsible panel **Model Visual Properties** contains tools for setting the material and visibility of all the elements in the Review model.



These links work as follows:

Option	Function
Freeze Current Materials	Takes a snapshot of the current materials that are applied to all the elements in the model. This provides a rollback point so the model elements can be reset to these materials. This is useful when using the data in the Data Viewer to highlight model elements with different material colours. If you freeze the materials before highlighting the elements then 'Reset All Materials' (see below) will remove the highlighting.
Reset All Materials	Resets the materials applied to elements to those of the snapshot provided by the last use of 'Freeze Current Materials'
Make All Invisible	Makes all the elements in the model invisible.
Make All Visible	Makes all the elements in the model visible.

18.1.3 Navigating To Elements

It is possible to use the Data Viewer to locate elements in the Observer View. In the Navigation panel there are three links that work as follows:

Option	Function
Focus on Element	Moves the camera to the identified element and looks at it.
Dynamic Focus on Element	As above but with dynamic movement.
Look to Element	Looks to the element but does not move the camera.

These operations will work with the currently selected element in the data grid.

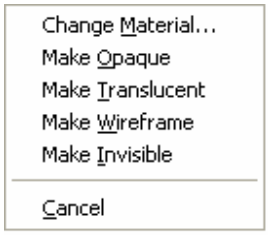
18.1.4 Context Menus for Elements in the Grid

The following context menus provide access to common functionality for the elements that are selected in the data grid.

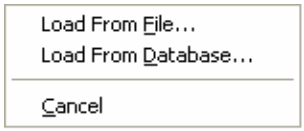
The context menu for a single element selection is as follows:

Option	Function
Focus on Element	Moves the camera to the identified element and looks at it.
Dynamic Focus on Element	As above but with dynamic movement.
Look to Element	Looks to the element but does not move the camera.
Change Material	Displays a dialog containing a list of materials. Selecting a material from this list will apply the material to all elements selected in the data grid.
Make Opaque	Makes the selected elements opaque.
Make Translucent	Makes the selected elements translucent.
Make Wireframe	Makes the selected elements wireframe
Make Invisible	Makes the selected elements invisible.

If multiple elements are selected in the grid then a shortened version of the above context menu is available:



If there are no elements in the grid then the following menu is available:



Option	Function
Load from File…	Load data into the grid from a text file.
Load from Database	Load data into the grid from a SQL database.

19 Command Line Options When Starting Review

Your system administrator has probably set up a Windows 'shortcut' which enables you to enter Review simply by double-clicking on its icon. You can however start Review from the command line in an **MS-DOS Prompt** window. Starting from the directory where the Review program files have been loaded, you would type:

Review.bat - to set up the system configuration

Review - to start Review (by running **Review.exe**).

You can add one or more arguments to the start-up command line to load such files automatically. You can also load and apply a clip file at start up, such that only those parts of the model file which comply with the clip specifications are actually loaded.

You can, further, start Review in 'imperial measurement' mode, such that all input and output dimensions shown on the forms are in feet and inches rather than in the default millimetre units.

The command line arguments which you can use have the following functions:

Option	Functiion
-m *model_file(s)*	Loads the specified model files in the order in they are listed.
-s *status_file(s)*	Loads the specified status files in the order in which they are listed.
-c *clip_file*	Loads the specified textual clip file
-imperial *type*	Specifies imperial measurement mode, where *type* determines the format and precision for displayed dimensions
Note: The following arguments are no longer supported in Review 6.2	
-d *screen_setup_file*	Loads the specified screen setup file
-credit *png_file*	Loads the specified PNG-format graphics file and displays the image on the Review screen

For example

```
Review –m models\atest.rvm -imperial 2
```

Loads the atest.rvm model file with dimensions to be shown in feet and inches, rounded to the nearest ½ inch.

19.1 Loading Model, Status and Clip Files

If you use the **-m**, **-s** and **-c** arguments to load model, status and clip files, respectively, Review will carry out the following operations on start up:

1. The clip file specified by the **-c** option will be loaded first. Any clip volumes defined within this file will be shown when the clip definitions are listed and will be available for use as soon as you enter Review.
2. The model files specified will be loaded in the order in which they follow the **-m** option. If a clip file has been loaded, only those parts of the models which comply with the definition of the *first* clip volume within that file will be loaded. When you load more than one model file in this way, checks are not made for duplication of element names.
3. The status files specified will be loaded in the order in which they follow the **-s** option and the configurations defined by them will be applied to the displayed model. If any part of the configuration conflicts with a preceding status file, you will be asked if the later data is to overwrite the earlier.

Note: The files specified by these arguments are *always* loaded and actioned in the order **-c -m -s**, as shown by the above numbered steps, regardless of the order in which they occur in the command line.

19.2 Editing a Textual Clip File

The format for a textual clip file, to be loaded using the **-c** command line argument when you run Review, is as follows:

CLIP	Identifies file as a clip file**.**
m n	File revision numbers (currently *m*=*n*=1).
ClipVolumeName1	Name of first clip volume.
minimum Z maximum Z	Limits for first clip volume; all in metres.
minimum Y maximum Y	Z, Y and X limits must be *minimum X maximum X* specified in this order.
ClipVolumeName2	Name of second clip volume (if any).

minimum Z maximum Z
minimum Y maximum Y Limits for second clip volume.
minimum X maximum X

Repeat sequence for each clip volume, as many times as necessary. You can create and/or edit such a clip file using any text editor.

Note: +Z = Up -Z = Down
+Y = North -Y = South
+X = East -X = West

19.3 Specifying Imperial Units for Dimensions

To start Review in 'imperial measurement' mode, so that all dimensions on the forms are in feet and inches rather than in the default millimetre units, use the command line argument

```
- imperial type
```

where *type* determines the format and precision for displayed dimensions.

The options available for *type* are as follows:

`decimal` or `0`	Dimensions will be shown with decimal values for inches; for example, `3′ 6.75`.
`2`, `4`, `8`, `16`, `32` or `64`	Dimensions will be shown with fractional inches, rounded to a precision of 1/2, 1/4, 1/64 inch, respectively; for example, `3′6.3/4`

Thus, the command:

```
review -imperial 32
```

starts Review in such a way that all dimensions will be shown in feet and inches, rounded to the nearest 1/32 inch.

The following dimensional formats are acceptable for entering data while in imperial measurement mode:

```
F F′ F′I
F′I.n/d F′I.fff
I″
I. I.n/d n/d .n/d I.fff .fff
```

Where

F = feet

I = inches

n/d = fractional inches

fff = *decimal inches*

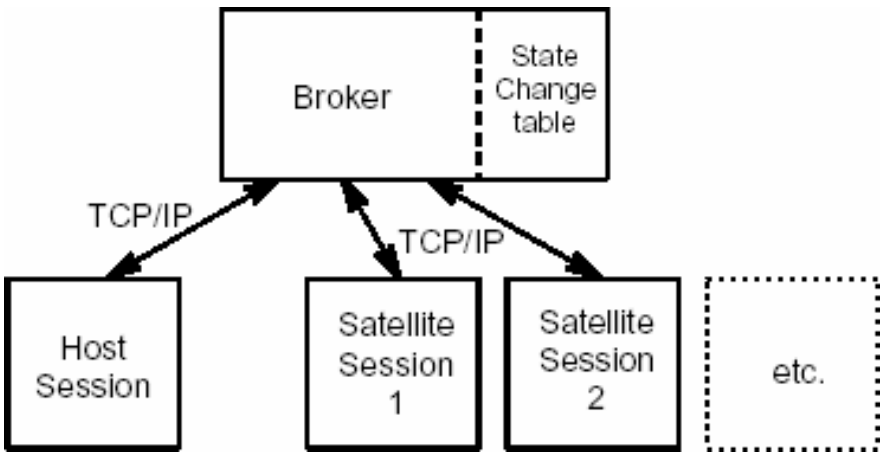
All inches may be followed by an optional ” symbol (except for I” where it is mandatory). All formats may be preceded by a - sign (for negative values).

20 Running Linked Review Sessions

20.1 Requirements for Running Linked Sessions

Note: The information in this Section gives a background summary only. The system should have been set up in a suitable configuration by your System Administrator before you begin, so ignore this Section if you simply want to join an existing linked session workgroup.

The obvious requirement is that all workstations which are to take part in the linked sessions must be networked together so that they can share data using a suitable communications protocol. The protocol used by Review is TCP (Transmission Control Protocol). The schematic configuration is as follows:



The process requires a broker daemon to be running on a nominated host on the network. This can be one of the workstations to be used to run Review (either as the host or as a satellite), or any other accessible workstation. This broker will control all Review traffic within the workgroup. It will record all changes to the model view, as received from the master workstation, in a state change table and will send the current data to any satellite workstation which requests it. There may be many brokers running on a single host, each with a different port number and each representing a different workgroup.

20.1.1 Starting up a Broker Daemon

4. **cd** to the **review.exe** directory
5. Run rsrbroker -p port_number

For example,

```
rsrbroker -p 2112
```

Note: You must select a port number which will not conflict with any existing processes. Contact your System Administrator in this regard.

Once the broker daemon is running, the first Review session to connect to the workgroup becomes the host session by default. All other sessions which connect will be satellite sessions. The host session can relinquish its status in favour of one of the satellite sessions at any time, and any session can disconnect from the workgroup at any time.

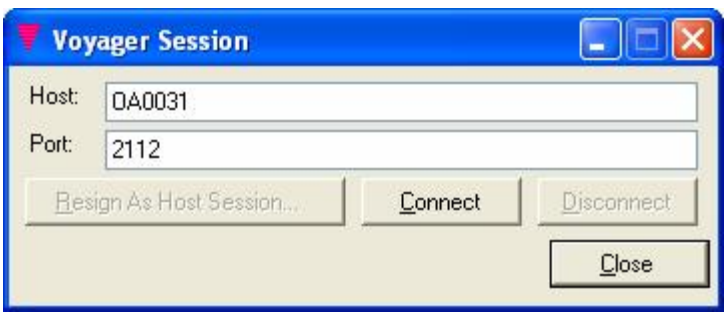
All sessions must be loaded with the same model and status files to ensure compatibility between them.

20.2 Connecting to a Linked Session Workgroup

Before you link your current Review session into a workgroup, first check that the conditions summarised in Section 20.1 have been established.

- If your session will be the first to connect to the workgroup, you will become the host session. The model data currently loaded into your session will determine what data subsequent satellite sessions must have loaded.
- If another session is already connected, you will become a satellite session. Check that you have loaded the model and status files appropriate to the workgroup.

To set up the link, select **Tools>Options>Voyager Session** from the main menu. You will see a **Voyager Session** form:



Enter the name of the **Host** (that is, the workstation on which the broker daemon is running) and the number of the **Port** via which it is accessible on the network (your System Administrator can give you these details). Click **Connect** to make the link.

20.3 Working in a Linked Session

If you are running the host session, all changes which you make to the **Observer View** settings will be shown automatically in each of the connected satellite sessions whenever they do a graphical refresh. If you are running a satellite session, your **Observer View** parameters will be derived automatically from those currently defined by the host session.

To *highlight* an item from the host session, so that you can refer to it unambiguously, hold down the Shift key while picking the object using the left-hand mouse button.

To *relinquish host status*, perhaps temporarily so that a satellite user can, say, highlight an object from their workstation, click the **Resign As Host Session** button (this is greyed out if you are in a satellite session). You will see a **Select New Host Session** form listing all satellite sessions in the current workgroup; select the one which is to take over as the host. The change will be confirmed by a message in the new host session. In a truly interactive workgroup, host status may be switched frequently between workstations, so that each user can contribute changes to the view in turn.

20.4 Disconnecting from a Linked Session

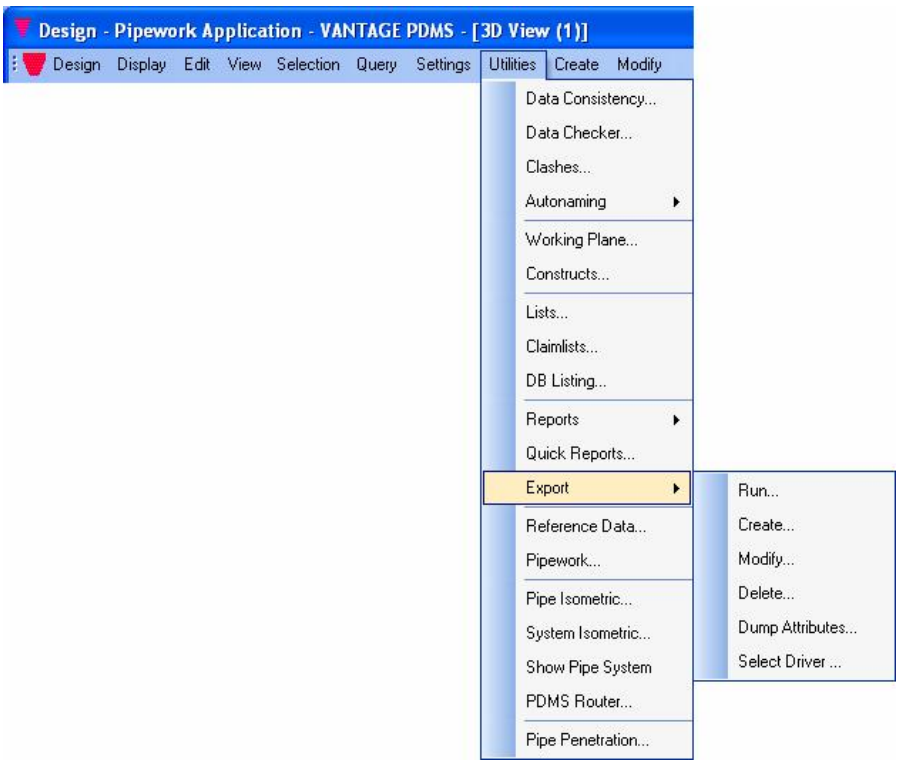
To disconnect from a linked session, click the **Disconnect** button. If you are running the host session, the satellite session with the longest established connection will take over as host by default. If you want to designate a specific satellite session to take over as the host, use the **Resign as Host Session** button (see Section 20.3) before you disconnect.

If you are running a satellite session, disconnection is the only option available to you.

In either case, disconnection only breaks the link to the workgroup. It does not affect your current Review session on your local workstation.

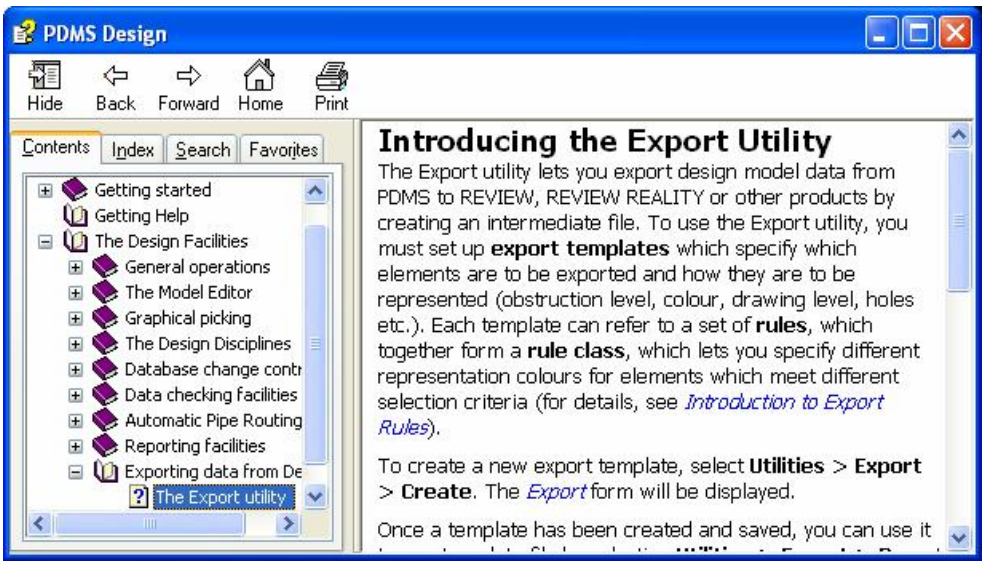
21 PDMS Design Export utility

21.1 Copying Model Data from PDMS to Review



The PDMS Design **Export** utility extracts from the PDMS Design database the relevant data for the primitives which will make up the display, including the Design hierarchy, and stores it in an intermediate file (a *model file*) for use by Review.

For full details of the Export utility, see the **Introducing the Export Utility** topic in the **Design** online help.


PDMS Design
Hide
Back
Forward
Home
Print
Contents
Index
Search
Favorites
Getting started
Getting Help
The Design Facilities
General operations
The Model Editor
Graphical picking
The Design Disciplines
Database change contr
Data checking facilities
Automatic Pipe Routing
Reporting facilities
Exporting data from De
The Export utility
Introducing the Export Utility
The Export utility lets you export design model data from PDMS to REVIEW, REVIEW REALITY or other products by creating an intermediate file. To use the Export utility, you must set up export templates which specify which elements are to be exported and how they are to be represented (obstruction level, colour, drawing level, holes etc.). Each template can refer to a set of rules, which together form a rule class, which lets you specify different representation colours for elements which meet different selection criteria (for details, see Introduction to Export Rules).
To create a new export template, select Utilities > Export > Create. The Export form will be displayed.
Once a template has been created and saved, you can use it

21.2 Command Line Options

The **EXPORT** command for use in PDMS Design in described in full in Chapter 4 of the VANTAGE PDMS *DESIGN Reference Manual, Part 4*.

22 Customising Review with .NET add-ins

22.1 Introduction

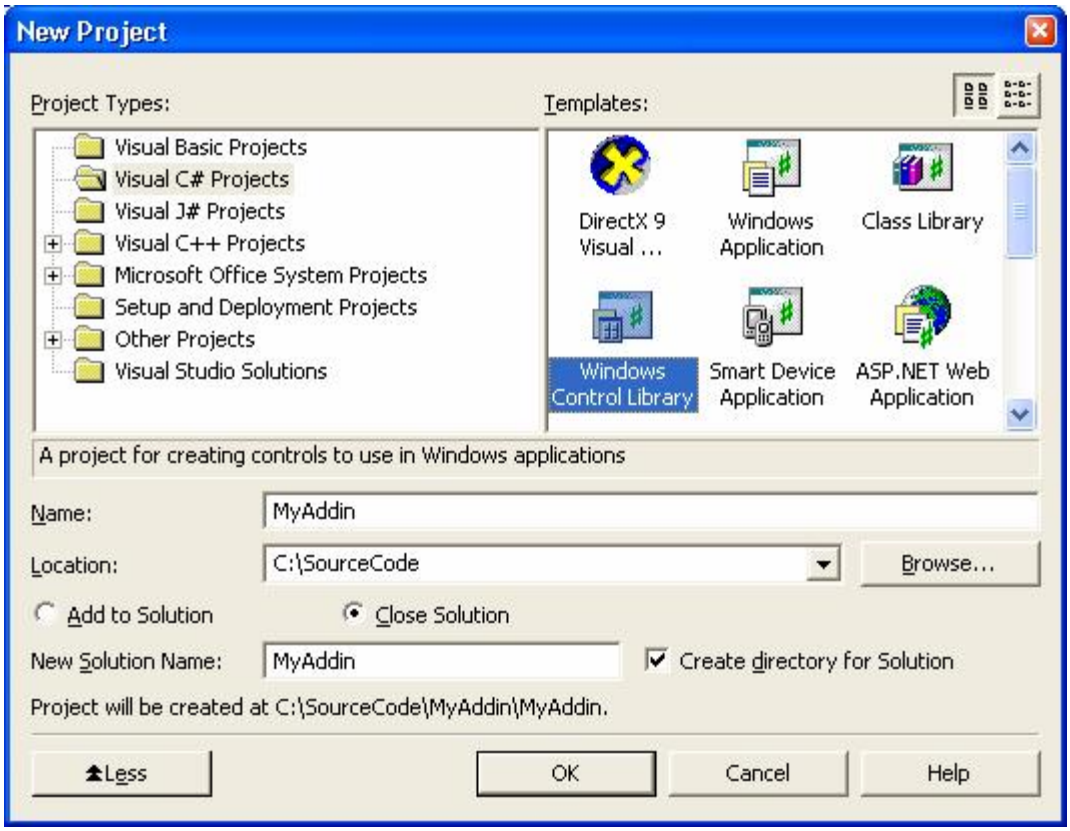
Review 6.2 introduces add-in technology which provides a new way to extend Review functionality. An add-in is a sub-application, written in a Microsoft .NET programming languages that can integrate closely with Review via a new exposed object model. The **Data Viewer** (see Section 18) is an example of an add-in.

> **Note:** add-in technology does not replace the command line method of customising Review.

22.2 Creating an add-in Project

This Section captures the user specification for creating add-ins for Review 6.2. Creating an add-in control requires a basic understanding of developing .NET Winforms User Controls using the Visual Studio .NET development environment. It also requires a basic understanding of implementing interfaces in classes, although this will be covered in this document.

First create a project for the add-in control. In this example the user control will be written in C# but it is possible to write a user control using any of the **.NET** languages. In the Visual Studio.NET development environment select **File>New>Project…** from the application main menu. This should bring up the 'New Project' dialog as seen below. Select **Visual C# Projects** from the **Project Types** field and select **Windows Control Library** from the **Templates** field. Enter a name for the project and a location to create the project in and click on **OK**.

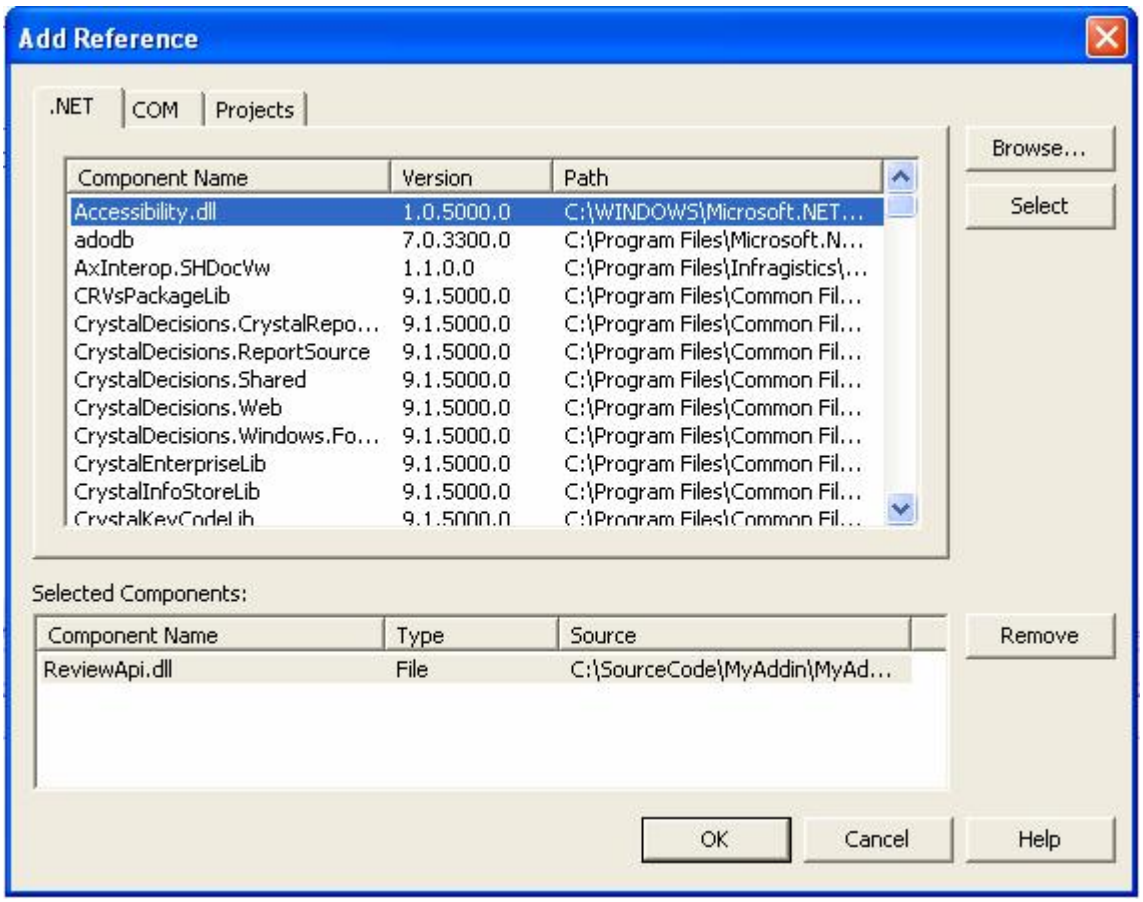


This should create a project with a **Winforms User Control** in. Next give the **User Control** a name (in this example the **User Control** will be named 'MyAddIn').

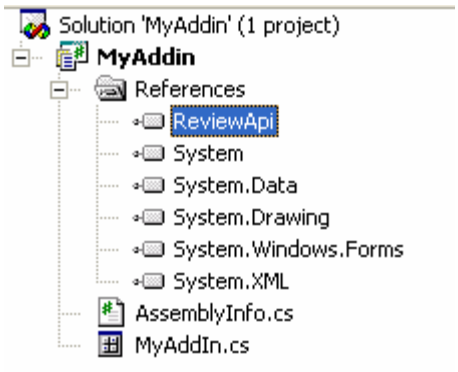
22.3 Developing the add-in

22.3.1 Adding a reference to Review

First add a reference to the **ReviewAPI.dll**. To do this **Select Project>Add Reference…** from the application main menu and browse for **ReviewAPI.dll** from the Review 6.2 Install directory.



This should add a reference to ReviewApi to the project references.



22.3.2 Developing the User Control as an add-in

View the code for the User Control. Then add the following line to the 'using' statements for the user control.

```
using Aveva.VPD.ReviewApi;
```

To create an add-in the project must contain a class that implements the IAddin interface defined in ReviewApi.dll. In this example this interface will be implemented in the MyAddin class. To do this add IAddin to the list of base interfaces for MyAddin.

```
namespace MyAddin
{
    /// <summary>
    /// Summary description for UserControl1.
    /// </summary>
    public class MyAddIn : System.Windows.Forms.UserControl, IAddin
    {
        /// <summary>
        /// Required designer variable.
        /// </summary>
```

Press TAB to implement stubs for interface 'Aveva.VPD.ReviewApi.IAddin'

Note: In Visual Studio.NET the development environment can add stubs for the members of the IAddin interface. This can be done by pressing TAB when prompted after add-ing IAddin to the list of base interfaces. The prompt can be seen in the picture below.

Otherwise populate the members of the IAddin interface into MyAddin manually.

When the add-in runs it will be passed an IReview Interface. This is the main interface to Review API and will be used for such things as material creation and navigation. Create a member of type IReview to store the interface in as shown below.

```
public class MyAddIn : System.Windows.Forms.UserControl, IAddin
{
    /// <summary>
    /// Required designer variable.
    /// </summary>
    private System.ComponentModel.Container components = null;
    private IReview reviewInterface;
```

When Review loads the add-ins it will call Start on each one and pass in its own IReview interface. Store this interface in the member created above.

```
public void Start(IReview review)
{
    reviewInterface = review;
}
```

Next fill in the **AddinName** property to return a name for the add-in. This is the name that will appear on the Review '**Addins'** menu and on the form title for the window containing the add-in.

```
public string AddinName
{
    get
    {
        return "My Addin";
    }
}
```

Every add-in must pass a user control to Review. This is the control that will be displayed in the add-in window and provides the main user interface to the add-in.

Note: It is possible to have the User Control defined in a separate class to the one that implements the IAddin interface. In this example however the IAddin interface is implemented in the User Control as this is the simplest way.

Review will query the add-in for the User Control that provides the GUI. Return the user control in the 'get' part of the 'Control' property.

```
public UserControl Control
{
    get
    {
        return this;
    }
}
```

This example will keep with the default return values provided for the 'Description' and 'Priority' properties. There will also be no extra functionality added to the 'Stop' function.

22.3.3 Responding to Review Selection changes

Review add-ins can subscribe to an event that will be fired whenever the active selection changes in Review. The active selection is the selection in the currently active Review window. Review windows that fire active selection change events are: **Explorer**, **camera windows**, **search results**, **drawlist**.

To subscribe to active selection change events first create a member to handle the event. The event handler should have the same signature as the one shown below.

```
public void ActiveSelectionChanged(object sender)
{
}
```

Next subscribe to the selection change event using this function to handle the event. This can be done via the static `SubscribeForSelectionChangedEvent` method on the `ReviewActiveSelection` class. The `ReviewActiveSelection` class provides access to the active selection through static methods.

```
public void Start(IReview review)
{
    reviewInterface = review;
    // Subscribe for Review element selection events.
    ReviewActiveSelection.SubscribeForSelectionChangedEvent(
        new ReviewActiveSelection.SelectionChangedEvent(ActiveSelectionChanged));
}
```

In the `ActiveSelectionChanged` function we can add some code to handle the selection change. In this example the name of the first element of the selection will be pasted into a text label on the user control.

Create a label on the user control with the name `elementNameLabel`. Now, in the `ActiveSelectionChange` function set the text of the label to the name of the first entry in the active selection set.

```
public void ActiveSelectionChanged(object sender)
{
    if (ReviewActiveSelection.Selection.Count > 0)
        elementNameLabel.Text = (String) ReviewActiveSelection.Selection[0];
}
```

The `Selection` member of `ReviewActiveSelection` is an `ArrayList` containing the names of the selected elements.

22.4 Using the Review API

Using the Review API it is possible to create materials, associate materials with elements in the Review model, change the display state of elements in the model and navigate to elements.

This example will demonstrate creating a material with colour and applying that material to the selected element in Review. It will also demonstrate navigating to the selected element.

22.4.1 Creating a Material

To create or query material info via the Review API use the `MaterialInfo` class defined in the ReviewAPI.dll.

First add a `MaterialInfo` member to the `MyAddin` class. Also, create a name for the material.

```
public class MyAddIn : System.Windows.Forms.UserControl, IAddin
{
    /// <summary>
    /// Required designer variable.
    /// </summary>
    private System.ComponentModel.Container components = null;
    private System.Windows.Forms.Label elementNameLabel;
    private IReview reviewInterface;
    private System.Windows.Forms.Button setMaterialButton;
    private MaterialInfo redMaterial;
    private string redMaterialName = "Red Material";
```

Next, in the `Start` function create a new material using the following:

```
redMaterial = new MaterialInfo(100, 0, 0, 0, 0, 0, 0, 0);
```

In this example the material is set up with red colour and values for ambient, metalness, specular, smoothness and transparency set to 0.

Next, check to see if a material with name “Red Material” already exists. If not create it then set it with the material information created above.

```
//Check to see if a material with name "Red Material" already exists
ArrayList materialNames = reviewInterface.GetAllMaterials();
materialNames =  review.GetAllMaterials();
if (!materialNames.Contains(redMaterialName))
{
    reviewInterface.CreateMaterial(redMaterialName);
}
reviewInterface.SetMaterialInfo(redMaterialName, redMaterial);
```

22.4.2 Applying the Material

To apply the material to the selected element; first add a button to the User Control named `setMaterialButton` and add an event handler for the ‘click’ event. In this event handler use the SetElementMaterial function to apply the red material to the element name in the label

```
private void setMaterialButton_Click(object sender, System.EventArgs e)
{
    reviewInterface.SetElementMaterial(elementNameLabel.Text, redMaterialName);
}
```

22.4.3 Navigating to the Selected Element

To apply the material to the selected element; first add a button to the User Control named `lookToElementButton` and add an event handler for the 'click' event. In this event handler use the `LookAtElement` function to look at the element.

```
private void lookToElementButton_Click(object sender, System.EventArgs e)
{
    reviewInterface.LookAtElement(CameraType.Obsever, elementNameLabel.Text,
                                  LookType.SnapMove, true);
}
```

This will look to the selected element in the observer window with snap move and highlighting.

22.5 Using the add-in in Review

When this project is built it will create a DLL named **MyAddin.dll**. Copy this DLL into the Addins directory below the Review install directory. When Review runs it will pick up this add-in and the name My Addin will appear under the main menu **Addins** menu. Clicking on this menu item displays the add-in.

When elements are selected in Review, for example in the **Explorer** window, their names will appear in the label `elementNameLabel`. Clicking on the button `setMaterialButton` paints the element red. Clicking on the button `lookToElementButton` navigates the observer to look at the element.

22.6 Configuring which add-ins that are loaded in Review

It is possible to specify which add-ins are loaded into Review when it runs. This is done by using a configuration file called '**Addins.xml**'. In this file list the add-in DLLs that will be loaded into Review when it runs. Add the paths to the add-in DLLs relative to the Review install directory, then place the **Addins.xml** file in the same directory as **Review.exe**. When Review runs it will look for the file '**Addins.xml**' if it finds this file it will only load those DLLs specified in this file. If it does not find and **Addins.xml** file it will load all add-ins that are in the Addins directory.

Below is an example of the contents of an **Addins.xml** file which specifies two add-ins to load: **DataViewer.dll** and **MyAddin.dll**.

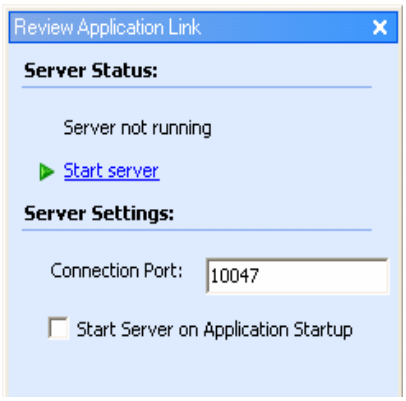
```
<?xml version="1.0" encoding="utf-8" ?>
<ArrayOfString xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <string>Addins\DataViewer.dll</string>
  <string>Addins\MyAddin.dll</string>
</ArrayOfString>
```

23 Review Application Link

23.1 Application Link add-in

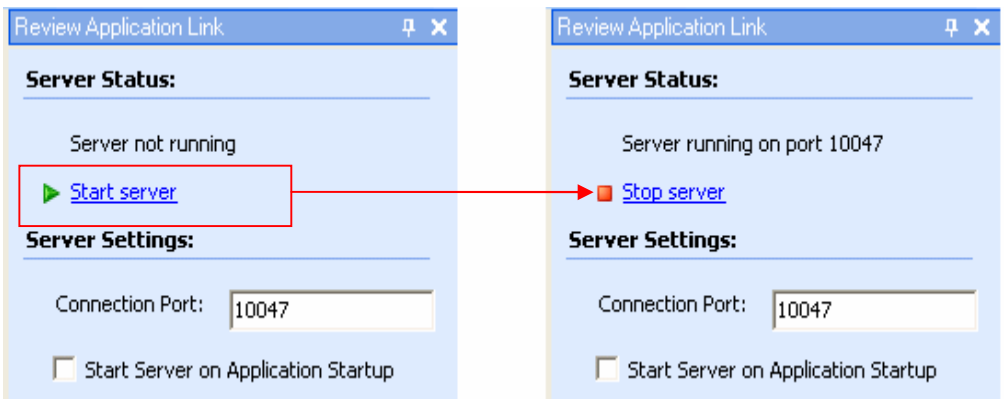
The Application Link add-in exposes the Review object model to external applications to enable them to manipulate Review. It provides a .NET Remoting server that runs on a communication port. External applications such as Excel can connect to this server to access the exposed object model.

The **Review Application Link** add-in can be found on the **Addins** menu. Use this add-in to start the **Application Link** server to allow other applications to connect to Review.



At the top of the form is the current status of the server. This indicates if the server is running and the connection port it is running on.

Start Server starts the Remoting server on the port indicated in the **Connection Port** field (see below). If the server is already running then this will read **Stop Server**



The **Connection Port** field allows for a port number to be specified for the Server connection. You must select a port number which does not conflict with any existing processes. Contact your system administrator for help on this.

It is possible the have the Application Link server start automatically when Review starts. To do this, check the **Start Server on Application S**tartup checkbox.

24 Linking to Review via a Remote Client

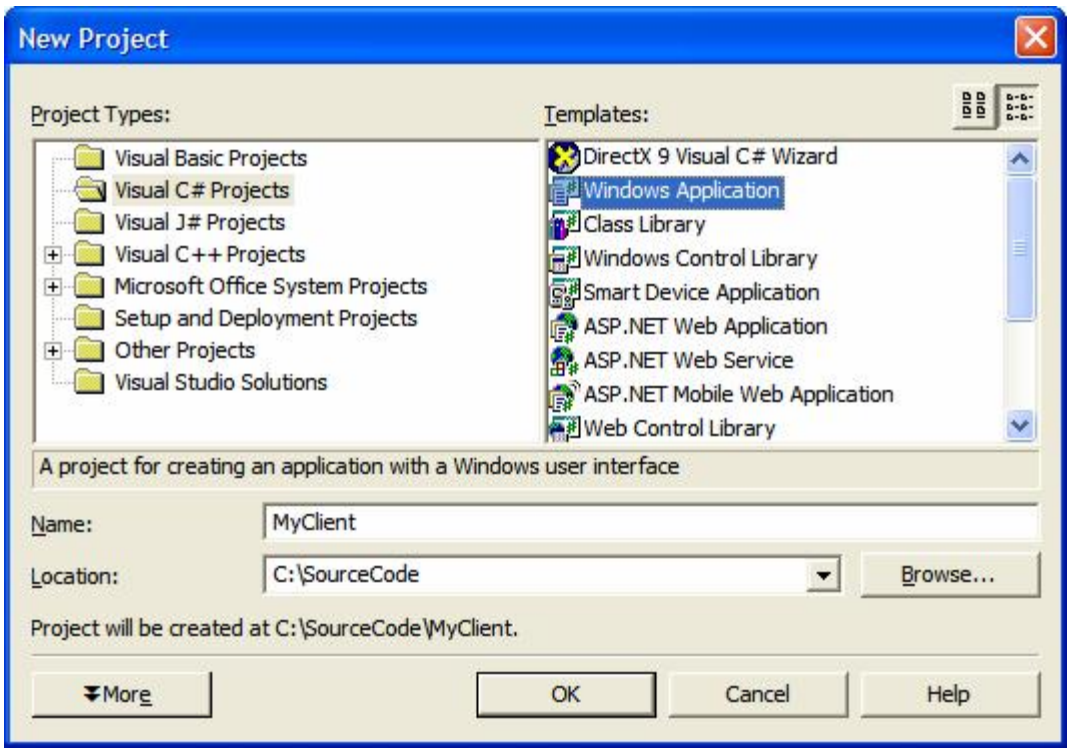
24.1 Introduction

Review 6.2 SP1 introduces the *ApplicationLink* add-in which exposes the Review API via .NET remoting technology. Now the power of the Review API is not limited simply to add-ins but any program linked to the Review API and communicating through .NET remoting.

24.2 Creating the client project

This Section captures the user specification for creating applications that may utilise the Review API. The final application can be as simple or as complex as required – however the method of linking to Review remains the same so only a simple example is provided here for clarity.

First create a project for the client application. In this example the application will be written in C# but it is possible to write the application using any of the **.NET** languages. In the Visual Studio.NET development environment select **File>New>Project…** from the application main menu. This should bring up the **New Project** dialog as seen below. Select **Visual C# Projects** from the **Project Types** field and select **Windows Application** from the **Templates** field. Enter a name for the project and a location to create the project in and click on **OK**.

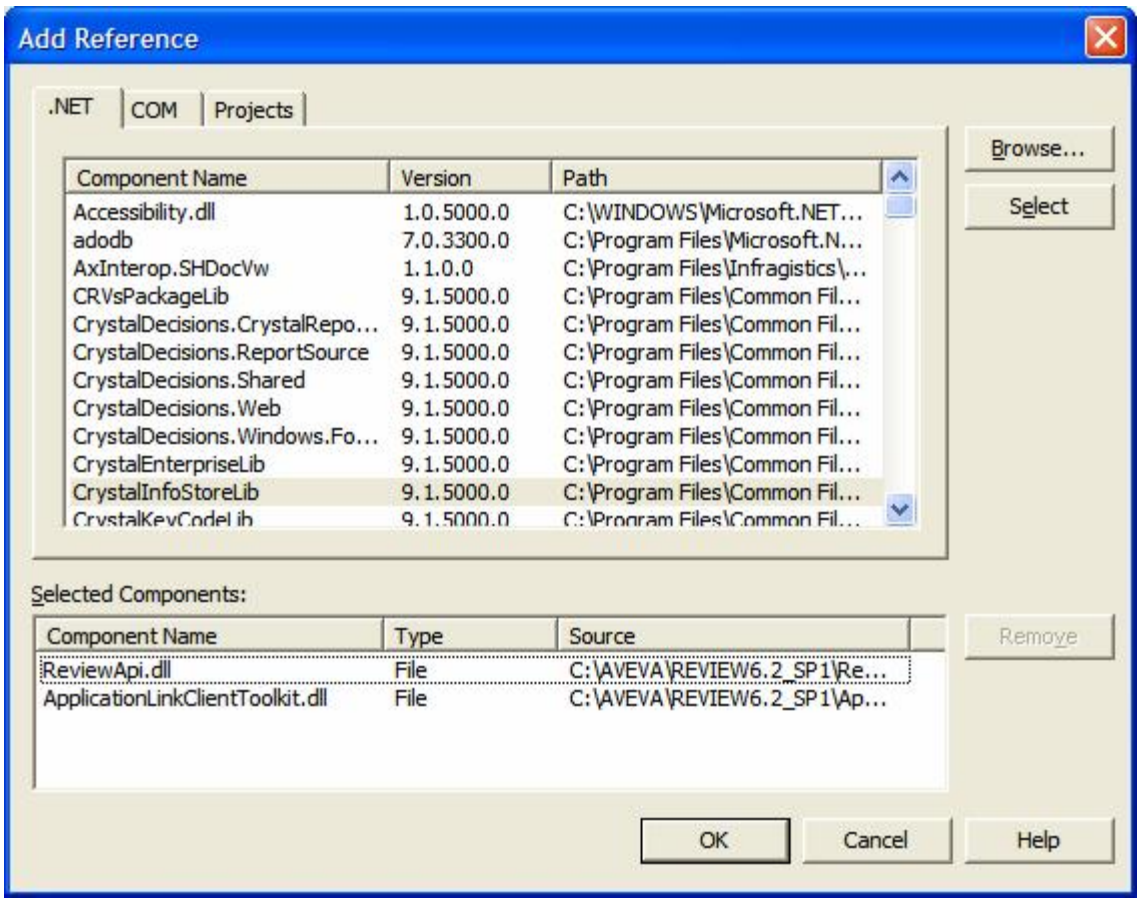


This should create a project containing a blank *Windows Form*. Next give the form a name (in this example the **Form** is named 'MyClient').

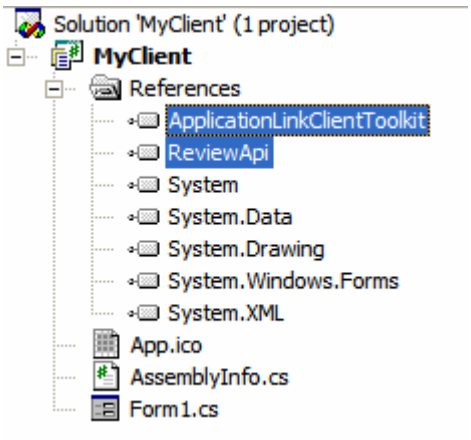
24.3 Developing the Client

24.3.1 Adding a reference to Review

First add references to the **ReviewAPI.dll** and **ApplicationLinkClientTookit.dll**. To do this **Select Project>Add Reference…** from the application main menu and browse for **ReviewAPI.dll** and **ApplicationLinkClientTookit.dll** from the Review 6.2 Install directory.

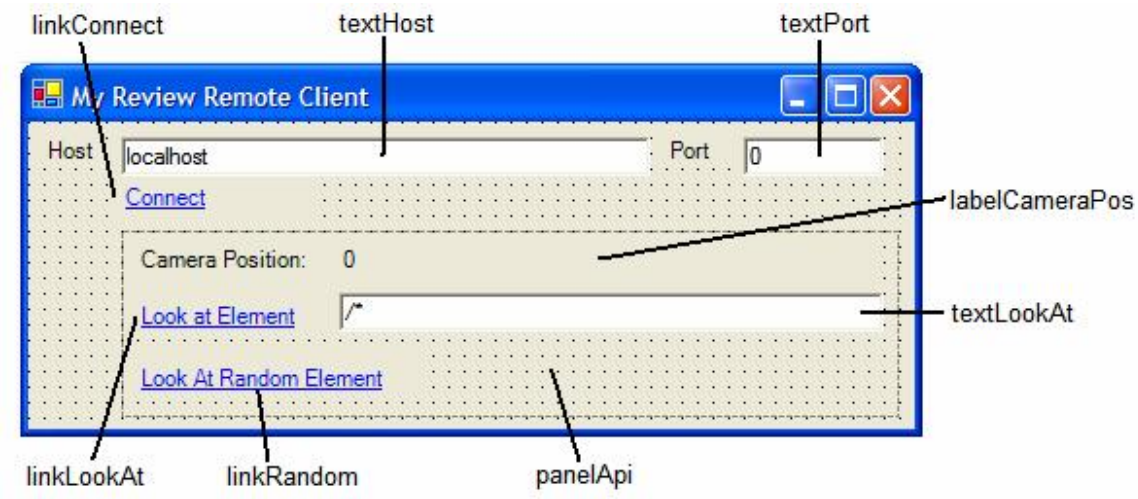


This should add a reference to ReviewApi and ApplicationLinkClientToolkit in to the project references.



24.3.2 Developing the client application link

View the form in designer mode and add the following **WinForms** tools with their respective names.



View the code for the Form. Then add the following line to the using statements for the form.

```
using Aveva.VPD.ReviewApi;
using Aveva.VPD.Review;
```

At the end of the constructor, add the following lines to initialise the form

```
textPort.Text = ApplicationLinkClientToolkit.GetRemotePort().ToString();
this.panelApi.Enabled = false;
```

24.3.3 Connecting to Review and receiving notifications

In the code, add two new members.

```
private IReview mReview = null;
private CameraEvents mCameraEvents = null;
```

These are used to store the remote connection made to Review via remoting.

Go to the designer and double-click the **Connect** link label – new click event handler code will be generated for you.

Before using the API we must first add code to first connect to the Review *ApplicationLink* server and then register for unsolicited events so that camera, material and visibility changes etc. can be detected by the client.

Fill the body of this method as follows.

```
private void linkConnect_LinkClicked(object sender, LinkLabelLinkClickedEventArgs e)
{
    try
    {
        // Connect to the ApplicationLink Server
        IReview r = ApplicationLinkClientToolkit.Connect(textHost.Text, int.Parse(textPort.Text));
        if (!ReferenceEquals(r, null))
        {
            // Save IReview interface
            mReview = r;
            // Register for unsolicited events from Review
            ApplicationLinkClientToolkit.RegisterForEvents();
            // Create event handler for camera events received from Review
            mCameraEvents = new CameraEvents(mReview.CameraManager);
            mCameraEvents.CameraChanged += new CameraChangedEvent(CameraChanged);
            // Enable WinForms controls                    Press TAB to generate handler 'CameraChanged' in this class
            this.panelApi.Enabled = true;
            this.linkConnect.Enabled = false;
            this.textHost.Enabled = false;
            this.textPort.Enabled = false;
        }
    }
    catch(Exception ex)
    {
        System.Windows.Forms.MessageBox.Show(ex.ToString());
    }
}
```

When add-ing the CameraChanged event handler a new method CameraChanged will by generated for you. This is fired when a new camera position event is received from Review. Fill in its body as follows to display the camera position in the client application.

```
private void CameraChanged(object sender, ICamera camera)
{
    float[] pos = camera.Position;
    this.labelCameraPos.Text =  "E=" + pos[0].ToString() +
                                ", N=" + pos[1].ToString() +
                                ", U=" + pos[2].ToString();
}
```

24.3.4 Sending commands to Review

Now that we can listen to notifications from Review we want to be able to send commands to Review.

We shall create two actions, look at specific element and look at a random element.

In the form designer, double-click the **Look At Element** link label and fill in the resulting event handler method with the following.

```
/// <summary>
/// Look at a named element in Review
/// </summary>
/// <param name="name"></param>
private void LookAt(string name)
{
    try
    {
        if (!ReferenceEquals(mReview, null))
        {
            // Find element to look at
            IElement target = mReview.ElementManager.GetElement(name);
            // Issue the command
            target.LookAt(mReview.CameraManager.GetCamera(CameraType.Observer),
                          LookType.SnapMove, true);
        }
    }
    catch(Exception ex)
    {
        MessageBox.Show(ex.ToString());
    }
}

private void linkLookAt_LinkClicked(object sender, LinkLabelLinkClickedEventArgs e)
{
    LookAt(textLookAt.Text);
}
```

To create the **Look at Random Element** method we must create a random number generator. Add the following member to the form class.

```
private System.Random mRandom = new Random(System.Environment.TickCount);
```

The following method should also be added to the class.

```
/// <summary>
/// Set the look at text box to a randomly selected element in the model
/// </summary>
private void LookAtRandom()
{
    try
    {
        if (!ReferenceEquals(mReview, null))
        {
            // Walk through the elements in the model starting at the root
            IElement target = mReview.ElementManager.RootElement;

            // To avoid selecting large elements, go to a depth of 5 generations
            for(int i = 0; i < 5; ++i)
            {
                IElement[] elements = target.Children;
                if (elements.Length > 0)
                {
                    // Pick a random sibling to use for the next iteration
                    int index = mRandom.Next(elements.Length - 1);
                    IElement t = elements[index];
                    // If the element name does not start with a '/' it is most likely
                    // the last in it's generation - just use this as the final element
                    if (!t.Name.StartsWith("/"))
                    {
                        break;
                    }
                    target = t;
                }
                else
                {
                    break;
                }
            }

            // Set text box text to selected element
            textLookAt.Text = target.Name;
        }
    }
    catch(Exception ex)
    {
        MessageBox.Show(ex.ToString());
    }
}
```

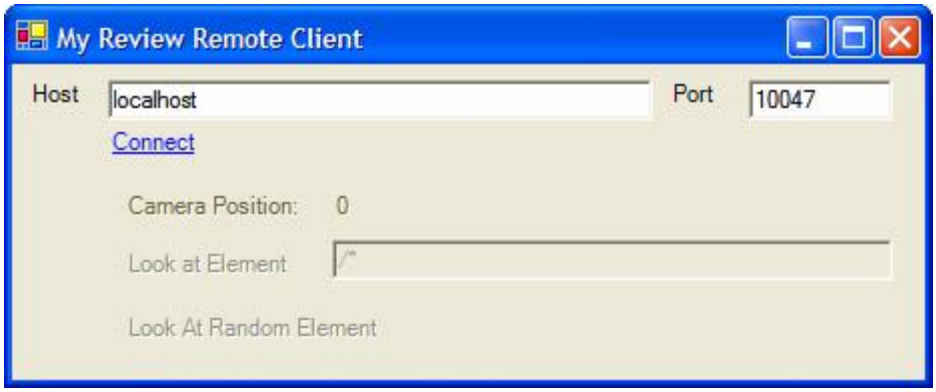
Now view the form in the designer and double-click the **Look at Random Element** to create the click event handler code. Add the following lines.

```
private void linkRandom_LinkClicked(object sender, LinkLabelLinkClickedEventArgs e)
{
    LookAtRandom();
    LookAt(textLookAt.Text);
}
```

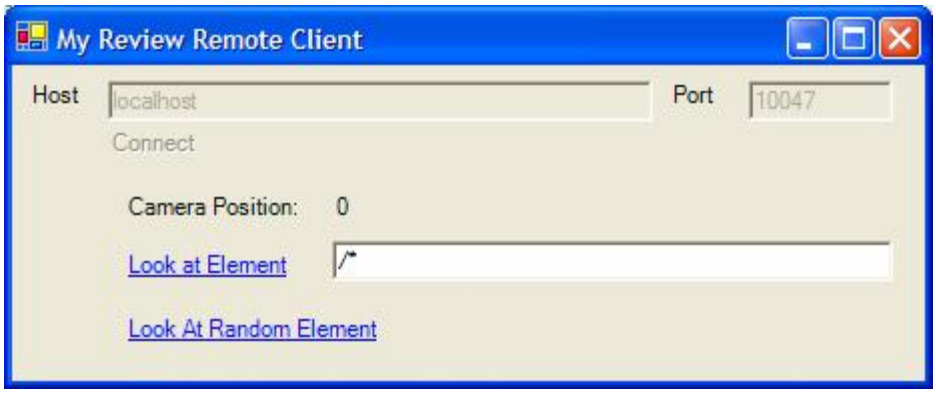
24.4 Using the client

Start a normal Review session ensure the *ApplicationLink* server is started and a model is loaded.

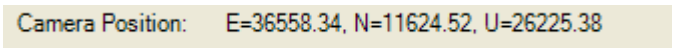
Now start the client application. Initially the client is not connected to Review.



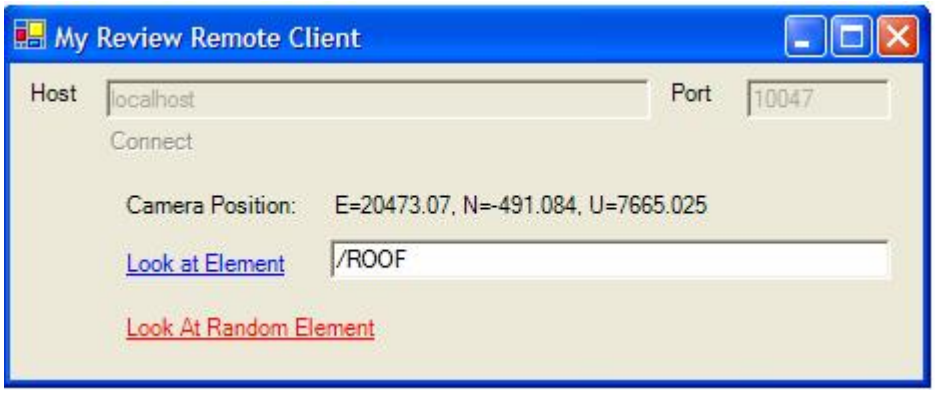
Click **Connect** – this initiates the connection to the *ApplicationLink.* If successful the remaining tools on the form will be enabled.



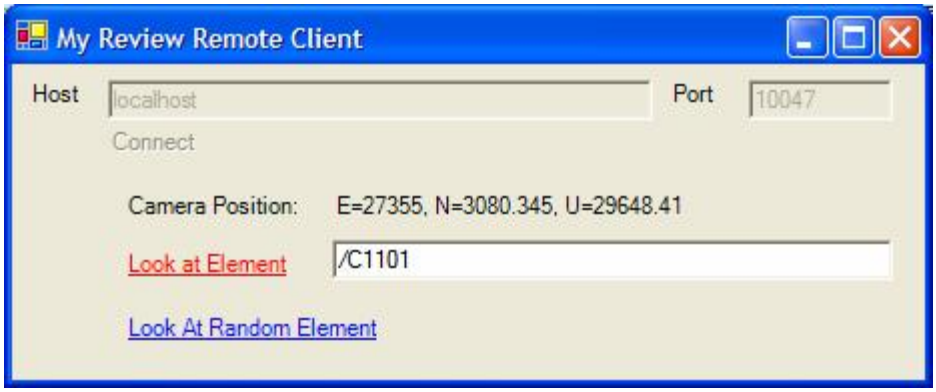
You can now check that navigating around the model in Review will update the client Camera Position text.



Clicking **Look At Random Element** focuses on a random element in the model.



Clicking **Look At Element** focuses on the element named in the text box.



25 Review Collaboration

25.1 Introduction

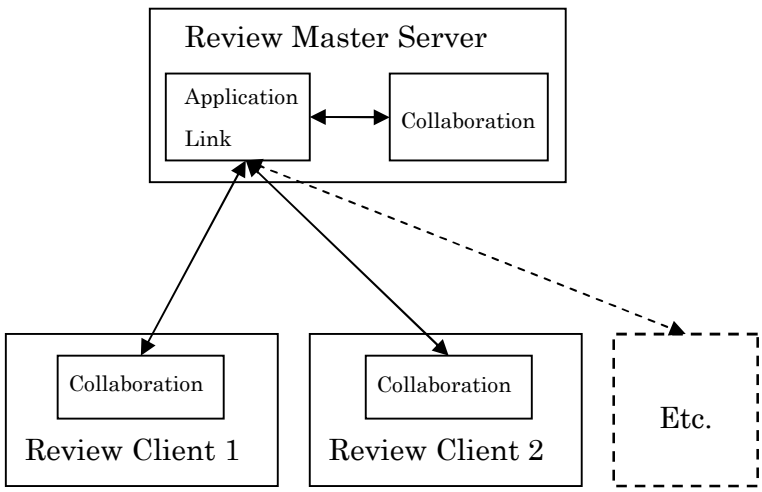
The Review Collaboration add-in allows multiple workstations that are running Review to connect to each other. Using this connection, movements of the Observer View and element material/visibility changes on a master workstation can be viewed by several client workstations.

25.2 Requirements for Running a Collaboration Session

The obvious requirement is that all workstations which are to take part in the collaboration session must be networked together so they can share data using the TCP communication protocol.

One of the Review workstations must operate as a master server. All other workstations will connect to the master server as clients.

All workstations need to have the Collaboration add-in loaded (see Section 25.3 for information about how to set up this add-in). The master server must also have the Application Link Server add-in loaded and running.



Note: Before running a Collaboration session the same model and status file should be loaded on all workstations.

25.3 The Collaboration Add-in

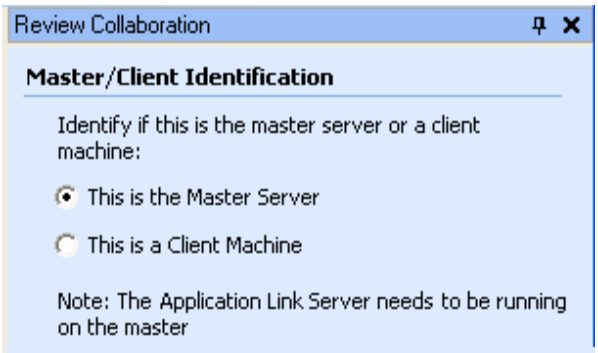
The Collaboration Add is used to manage the communication settings for the collaboration session. This add-in needs to be loaded into each Review application that will take part in the collaboration session.

25.3.1 The Master Server

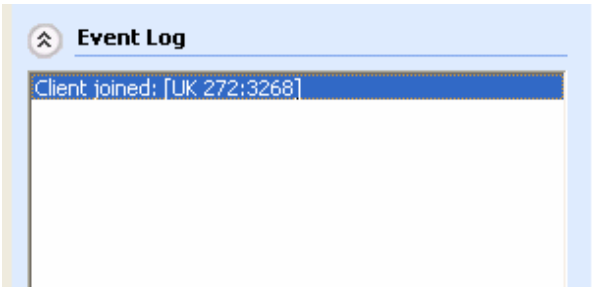
One Review workstation must act as a *Master Server* for the collaboration session. Camera and material changes made on the master will be reflected in the client workstations. See section 25.4 for a list of events sent to the clients.

To host a collaboration session, first start the Application Link Server on the master. See Section 23 for more on the Application Link Server.

Next, open the Collaboration add-in and check the **This is the Master Server** option.

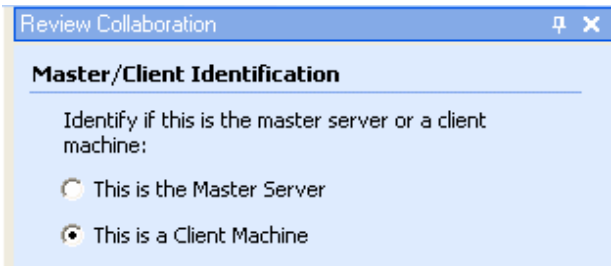

Review Collaboration
Master/Client Identification
Identify if this is the master server or a client machine:
This is the Master Server
This is a Client Machine
Note: The Application Link Server needs to be running on the master

Significant events such as clients joining the session are logged in the event log. Expand the event log by clicking on the title or the expand icon.



25.3.2 The Client Sessions

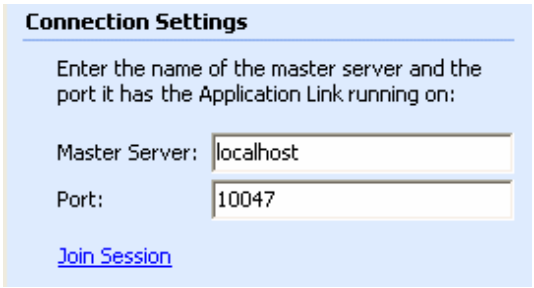
To run as a client session open the Collaboration add-in and check the **This is a Client Machine** option.


Review Collaboration
Master/Client Identification
Identify if this is the master server or a client machine:
This is the Master Server
This is a Client Machine

Checking this option opens up more options on the form that allow you to specify the connection settings.

25.3.3 Connection Settings

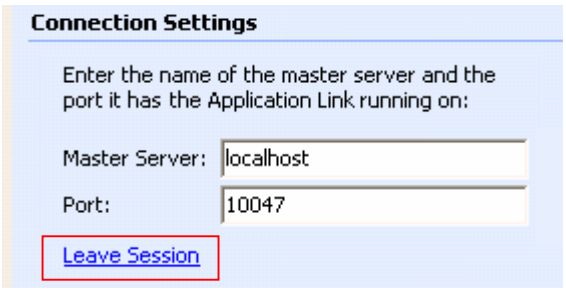
Use the connection settings to identify the Master Server machine and specify which port it is running the Application Link Server on. The Collaboration add-in connects to the Application Link Server on the master to receive camera and material change events.



In the **Master Server** field enter the name or IP address of the Master Server machine.

In the **Port** field enter the number of the port the Master Server is running the Application Link Server on. Your system administrator can give you details on the machine name and how to use communication ports.

Click on **Join Session** to join the collaboration session. This link will change to read **Leave Session** when you join the session. Clicking on **Leave Session** disconnects you from the collaboration session.

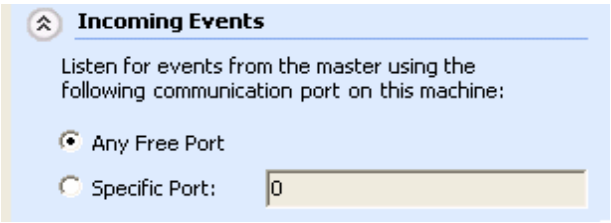


25.3.4 Incoming Events

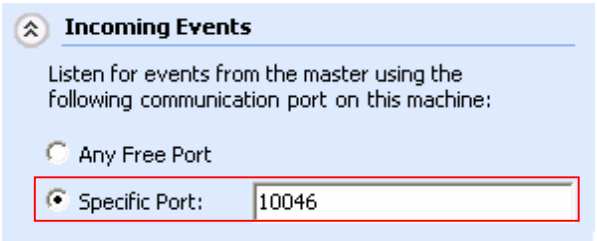
The Master Service sends events to all of the clients connected to it. Typically a client running the Collaboration add-in listens for these events on any port that is free on the machine.

If your system administrator requires that a specific port must be used (for example if port access is limited by a firewall) then you can identify a specific port to listen on.

To do this first expand the **Incoming Events** panel by clicking on the title or the expand icon.


Incoming Events
Listen for events from the master using the following communication port on this machine:
Any Free Port
Specific Port:
0

There are two options available in this panel. Any free port is the default option described above. Click on **Specific Port** and enter the port number in the text box to listen on a specific port.


Incoming Events
Listen for events from the master using the following communication port on this machine:
Any Free Port
Specific Port:
10046

25.3.5 Event Log

As with the Master Server mode the Event Log keeps note of significant events that happen in the collaboration session.

25.4 Using a Collaboration Session

The following events are sent to the client workstations when changes are made in the master.

25.4.1 Camera Events

When running a collaboration session any movements in the **Observer View** of the Master Server are reflected in the client workstations. Changes to the **Observer View** that happen as a result of running an animation on the master will also be reflected in the clients.

> **Note:** If the client workstations do not have the same graphics processing power of the master then the frame rate of the movements may be lower in the clients.

25.4.2 Element Material and Visibility Changes

If the material type or visibility of an element is changed on the master then this will also be reflected in the clients. This makes it possible to highlight elements or make them invisible in a collaboration session.

25.4.3 Graphical Selections

Changes to the graphical selection in the **Observer View** of the master session are reflected in the client sessions.

25.4.4 Materials

When materials are created or deleted in the master the client workstations are updated to reflect the new materials. Also when the properties of a material are changed in the master the client workstations are updated.

> **Note:** Texture property information changes on the master are not sent to the client workstations.

Appendix A View Manipulation in Review version 6.2

Note: The facilities detailed here are only those which are *exclusive* to Classic mode. See Section 5.4 for other facilities available in Classic mode.

A.1 Direct Manipulation Using the Mouse

You can change the view by pressing the *middle mouse button*. The effect depends on the following:

- The type of change depends on the current primary mode (Zoom, Rotate or Pan)

A.1.1 Setting the Manipulation Mode

Primary Manipulation Mode

You can set the primary mode for manipulation to Zoom, Rotate or Pan. The currently selected mode determines how the model view changes when you click or hold down the middle mouse button.

Set the primary mode by clicking in the view with the right-hand mouse button to display a context menu and selecting the desired mode – either Zoom, Rotate or Pan.

Secondary Manipulation Mode

Having set the primary mode, the way in which the view responds to operation of the middle mouse button is qualified by the secondary mode setting. This may be Single Step, Step, Continuous or Spin. To set the secondary mode, choose the required setting from the **Options>Mode>** menu. Note that you may set the Spin direction to *Clockwise* or *Anticlockwise*.

In Single Step mode the view changes only when you release the mouse button (giving one move per press of the button).

In Step mode the view changes continuously for as long as you hold down the mouse button (although you can still execute a single step change by clicking the button quickly). The extent of the change for each interval of the movement is equal to the current increment settings (see Section 0).

In Continuous mode the view changes continuously for as long as you hold down the mouse button (although you can still execute a single step change by clicking the button quickly). The extent of the change for each interval of the movement, up to a maximum determined by the current increment settings, is determined by the position of the

pointer on the screen, as explained in Section A.1.3. This gives you finer control over the movements than Step mode.

In Spin mode the view rotates continuously (overriding the primary mode) even after you have released the mouse button, until you specifically pause it or stop it. The incremental change during spinning is the current rotational increment (see Section 0).

To stop a 'spinning' model, select **Tools>Options>Mode>Spin>Stop.**

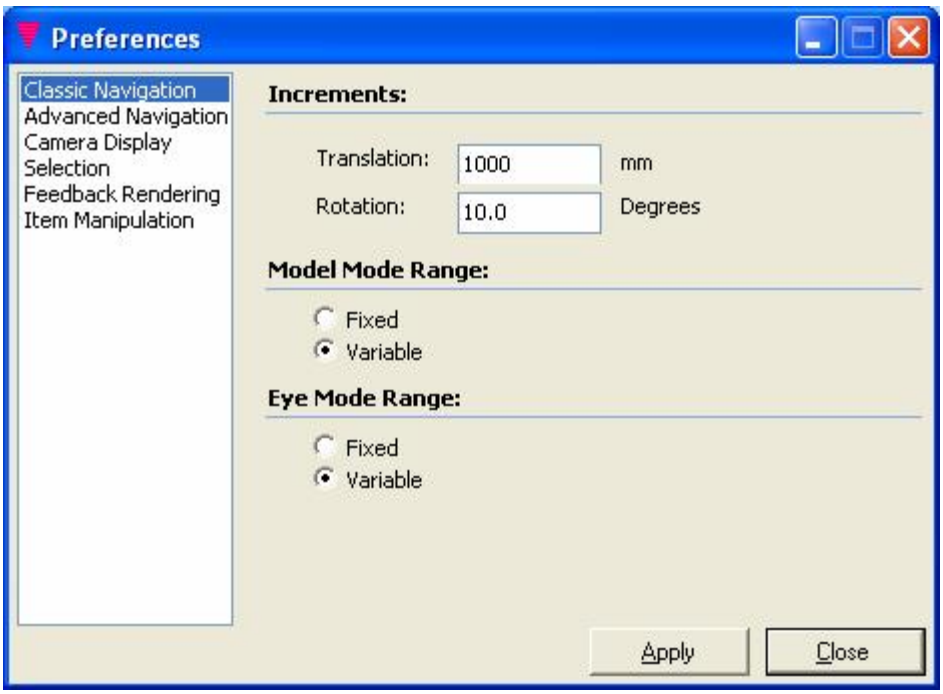
A.1.2 Setting the Centre of Rotation

The orientation of the line of sight is defined in terms of its bearing (rotation about a vertical axis) and its elevation (rotation about a horizontal axis). These axes may intersect each other either at the observer's eye point or at the model's through point, so that the effect of view manipulations may be actioned in either of two ways:

- As though the model remains stationary and the observer's eye point moves
- As though the observer's eye point remains stationary and the model moves

To set the required centre of rotation, use the **Tools>Options>Observer>** menu to choose the point (**Eye** or **Model**) about which the line of sight is to rotate.

Alternatively, the **Preferences** form may be used (**Tools>Options>Preferences...**).



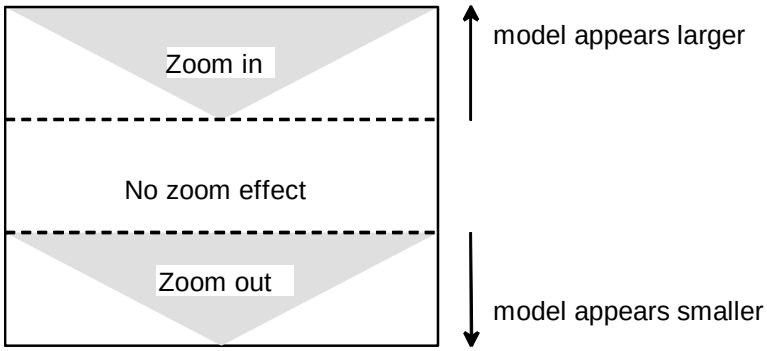
A.1.3 Controlling the View Using the Mouse

The Display Centre and Inactive Area

Manipulating the view using the mouse depends on the position of the pointer in the graphics window. There is an inactive region in the centre of the display.

Zooming In and Out

Set the primary mode to Zoom by selecting **Zoom** from the menu displayed when you press the right-hand mouse button with the pointer in the graphics area. The effect of pressing the middle mouse button depends on the position of the pointer in the graphics area:



In continuous mode, the extent of each zoom operation depends on how far the pointer is from the screen centre. The further it is from the centre, the greater the effect. The maximum change (when the pointer is at the top or bottom of the screen) corresponds to a movement of the eye point along the line of sight by the current translational increment.

Exercise:

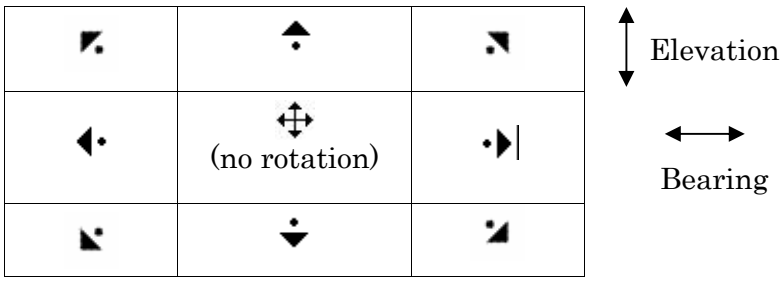
Zoom in and out of your displayed view by different amounts. Notice how the pointer changes shape when the middle mouse button is pressed; the shape depends on which band of the screen the pointer is in.

Try the different effects of using single step, step and continuous modes.

Try using different Range Variation settings and notice how the model flips under some circumstances as you zoom the eye point through the through point.

Rotating the View

Set the primary mode to Rotate by selecting **Rotate** from the menu displayed when you press the right-hand mouse button with the pointer in the graphics area. The effect of pressing the middle mouse button depends on the position of the pointer in the graphics area:



In continuous mode, the extent of each rotate operation depends on how far the pointer is from the screen centre. The further it is from the centre, the greater the effect. The maximum change (when the pointer is at the edge of the screen) corresponds to a movement of the line of sight by the current rotational increment.

Exercise:

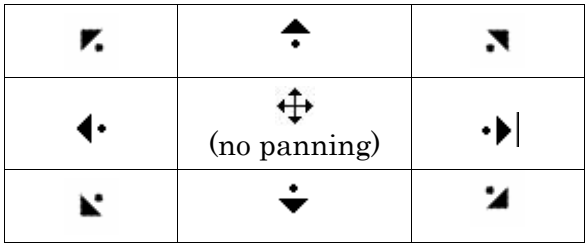
Try the effects of rotating your line of sight by different amounts in all directions. Notice how the pointer changes shape when the middle mouse button is pressed; the shape depends on which area of the screen the pointer is in.

Try using single step, step and continuous secondary modes, and changing between eye movement and model movement, to see the different effects.

Start the model spinning continuously by selecting **Tools>Options>Mode>Spin>Clockwise**.

Panning the View

Set the primary mode to Pan by selecting **Pan** from the menu displayed when you press the right-hand mouse button with the pointer in the graphics area. The effect of pressing the middle mouse button depends on the position of the pointer in the graphics area:



In continuous mode, the extent of each pan operation depends on how far the pointer is from the screen centre. The further it is from the centre, the greater the effect. The maximum change (when the pointer is at the edge of the screen) corresponds to a movement of the line of sight by the current translational increment

Exercise:

Try the effects of panning your displayed view by different amounts in all directions. Notice how the pointer changes shape when the middle mouse button is pressed; the shape depends on which area of the screen the pointer is in.

Try using single step, step and continuous secondary modes to see the different effects.

Note: If you have a 'wheel mouse', then the wheel can be used to perform zooming and 'vertical' pan and rotate operations.

A.2 Setting a Constrained Walk Path

A walk path is a fixed straight line which you define from your current eye point to a specific point within the displayed model. The effect of the walk path is relevant only when you use the *zoom* function to change the view. In such a case, the use of a walk path constrains movement of the eye point relative to the fixed straight line in one of the following ways:

- When in Eye mode, zooming moves the eye point along the defined walk path itself. The eye point cannot be moved off the walk path.
- When in Model mode, you can rotate the line of sight so as to move the eye point off the defined walk path; subsequent zooming then moves the eye point along a line through its new starting point and parallel to the defined walk path.

Walk paths are of most use in Eye mode, which gives the effect of an observer moving along, say, a walkway and being able to look in any direction while doing so. Only this mode will be considered further.

To define a walk path, select **Tools>Options>Walkpath>Towards>** with the **Observer View** selected and define a point within the displayed view in either of the following ways:

Centre defines the walk path as the line through the current eye point and the centre of the screen display (i.e. the current through point).

>Name… defines the walk path as the line through the current eye point and the origin of a named element. Enter the required element name in the displayed text box.

When you define a walk path in this way, you automatically enter Walkpath mode. To remove the walkpath constraints and return to normal manipulation of the view, select **Tools>Options>Walkpath>Clear.**

Exercise:

Set up your **Observer View** display so the latest model is approximately centred in the view and looking North.

Ensure that you are in Continuous : Zoom : Eye mode and use the zoom function to move towards and away from the displayed model once or twice.

Now select **Tools>Options>Walkpath>Towards>Name** and enter the name of an element well away from the centre of the current display (say the top of the tall column) and **Apply** the **Define Walkpath Towards** form. Select **Tools>Options>Walkpath>Clear** to leave Walkpath mode.

Appendix B The Review Object Model

B.1 IReview

IReview is the main access point to the Review API. Some of the common Review functionality is available via functions on IReview. Using IReview it is also possible to get access to various manager classes that provide greater functionality.

B.1.1 Members

Member	Description	
CreateMaterial	Creates a material with the supplied name in Review.	
Argument	**Type**	**Description**
material	String	The name of the material to create.

Member	Description
FreezeMaterials	Freezes the current state of material association to elements in the model. This creates a snapshot of the current element-material association that can be rolled-back to with a call to ResetMaterials()

Member	Description
ResetMaterials	Resets the element-material association to the state at the last call of FreezeMaterials(). If FreezeMaterials() has not been called then this will roll all elements back to the materials defined in the model file.

Member	Description
GetAllMaterials	Returns an ArrayList of String objects containing the names of all materials currently defined in Review.

Member	Description
GetBackgroundColour	Returns a Color object that defines the background colour to use for add-in user controls. This helps add-in controls fit in with the visual style of Review.

Member	Description	
GetMaterialExists	Returns a bool that defines if a material with the supplied name already exists in Review.	
Argument	**Type**	**Description**
material	String	The name of the material to query.

Member	Description	
GetMaterialInfo	Gets information about a given material.	
Argument	**Type**	**Description**
material	String	The name of the material to query.
Info	MaterialInfo	A MaterialInfo object that will receive the material information

Member	Description	
GetMaterialVisibility	Returns a VisibilityType that defines the visibility of the material	
Argument	**Type**	**Description**
material	String	The name of the material to query.

Member	Description	
LookAtElement	Sets a camera to look at an element in the model.	
Argument	**Type**	**Description**
camera	Aveva.VPD.ReviewApi.CameraType	The camera to use, can be the Observer window or one of the other 7 cameras
element	String	The name of the element to look at
lookMethod	Aveva.VPD.ReviewApi.LookType	The type of move method. Can be snap, dynamic or no move.
highlight	bool	Defines if the element should be highlighted after the move.

Member	Description
RefreshAll	Refreshes the Review displays.

Member	Description
SetAllElementVisibility	Sets the visible state of all elements in the model

Argument	Type	Description
visibility	Aveva.VPD.ReviewApi.VisibilityType	The visibility type to set on all elements in the model.

Member	Description	
SetElementMaterial	Sets material type for a list of elements	
Argument	**Type**	**Description**
element	ArrayList	An ArrayList of String objects containing the names of element to apply the material to
material	String	The name of the material to apply to the elements.

Member	Description	
SetElementMaterial	Sets material type for a single element	
Argument	**Type**	**Description**
element	String	The name of element to apply the material to
material	String	The name of the material to apply to the element.

Member	Description	
SetElementVisibility	Sets visibility type for a list of elements	
Argument	**Type**	**Description**
element	ArrayList	An ArrayList of String objects containing the names of element to apply the material to
visibility	Aveva.VPD.ReviewApi.VisibilityType	The visibility type to apply to the elements.

Member	Description	
SetElementVisibility	Sets visibility type for a single element	
Argument	**Type**	**Description**
element	String	The name of element to apply the material to
visibility	Aveva.VPD.ReviewApi.VisibilityType	The visibility type to apply to the element.

Member	Description
SetMaterialInfo	Sets information for a given material.

Argument	Type	Description
material	String	The name of the material to query.
Info	MaterialInfo	A MaterialInfo containing the information on the material to be set.

Member	Description	
SetMaterialVisibility	Sets the visibility type for a given material.	
Argument	**Type**	**Description**
material	String	The name of the material to query.
visibility	Aveva.VPD.ReviewApi.VisibilityType	The visibility type to apply to the material.

Member	Description
CameraManager	Gets the camera manager interface

Member	Description
ElementManager	Gets the element manager interface

Member	Description
MaterialManager	Gets the material manager interface

Member	Description
Instance	Gets Review interface instance

Member	Description
UserEventManager	Gets the user event manager

Member	Description
Id	Gets the Review Instance Id

B.2 IAddin

IAddin needs to be implemented by any class in the add-in assembly. At runtime Review will load the add-in assemblies and communicate with them via the IAddin interface. Review will pass an IReview interface to the add-in when it starts. Review will also get the main user control that will be displayed in the Review main Window.

B.2.1 Members

Member	Description	
Start	This function will be called by Review to indicate to the add-in that it can start processing calls to Review. Review will also pass the add-in an IReview interface to make calls to.	
Argument	**Type**	**Description**
review	Aveva.VPD.ReviewApi.IReview	The interface to Review to make calls to.

Member	Description
Stop	This function will be called by Review to indicate that it must stop making calls to the Review Interface.

Member	Description
AddinName [get]	The name of the add-in that will be used to identify it in the Review GUI. This name will be added to the Addin menu list so the add-in can be displayed and hidden. This name will also appear in the title bar of the window containing the add-in control.

Member	Description
Control [get]	Returns the User Control that will be displayed in the add-in window. This User Control will provide the main GUI for the add-in

Member	Description
Description [get]	A description of the add-in

Member	Description
Priority [get]	Unused in this version of Review

B.3 ICamera

Provides interface for a particular camera or view of the model. This should be used for camera specific actions such as setting the position and orientation or getting the currently picked elements for the view.

B.3.1 Members

Member	Description
CameraType	Gets the CameraType for the camera.

Member	Description
Position	Gets or sets an array of floats representing the position of the camera in the model

Member	Description
Centre	Gets or sets an array of floats representing the optical centre of the camera in the model

Member	Description
Bearing	Gets or sets a float representing the bearing of the camera

Member	Description
Elevation	Gets or sets a float representing the elevation of the camera

Member	Description
Roll	Gets or sets a float representing the roll of the camera

Member	Description
FOV	Gets or sets a float representing the field of view of the camera

Member	Description	
SetPositionAndCentre	Sets the position, optical centre and roll of the camera using the specified values	
Argument	**Type**	**Description**
position	float[]	An array indicating the position of the camera
centre	float[]	An array indicating the optical centre of this camera
roll	float	A value indicating the roll of the camera

Member	Description
PickedElements	Gets or sets an array of elements picked on the camera

Member	Description
PickedElementNames	Gets or sets an array of strings which represent the names of the elements picked on the camera

B.4 CameraEvents

Provides a concrete class that exposes camera events from within Review. A client may subscribe to these events by creating a new instance of the class and attaching to the provided event members.

B.4.1 Members

Member	Description	
CameraEvents	Creates a CameraEvents object	
Argument	**Type**	**Description**
M	Aveva.VPD.ReviewApi.ICameraManager	The Camera Manager object

Member	Description
CameraChangedEvent	Occurs when a camera changes

B.5 ICameraManager

Provides an interface for the management of cameras within Review. This should typically be used for obtaining the interface to a specific camera.

B.5.1 Members

Member	Description	
GetCamera	Retrieves an ICamera object for the specified camera	
Argument	**Type**	**Description**
Camera	Aveva.VPD.ReviewApi.CameraType	The camera to be retrieved

B.6 IElement

Provides interface for a particular element. This should be used for element specific actions such as setting its visibility state or material assignment.

B.6.1 Members

Member	Description
Name	Gets the name of the element

Member	Description
VisibilityType	Gets or sets a VisibilityType enum representing the visibility type of the element

Member	Description
Material	Gets or sets an IMaterial object representing the material of the element.

Member	Description
Selected	Gets a Boolean value indicating whether the element is in the Active Selection.

Member	Description	
AddToSelection	Adds the element to the Active Selection.	
Argument	**Type**	**Description**
sender	object	The sender of the request.

Member	Description	
RemoveFromSelection	Removes the element from the Active Selection.	
Argument	**Type**	**Description**
sender	object	The sender of the request.

Member	Description
Children	Gets an array of the child elements

Member	Description
Parent	Gets the parent element

Member	Description	
LookAt	Looks at the element on the specified camera	
Argument	**Type**	**Description**
camera	Aveva.VPD.ReviewApi.ICamera	The camera to be moved.
lookMethod	Aveva.VPD.ReviewApi.LookType	The method by which the camera should be moved.
highlight	bool	A value indicating whether the element should be highlighted after the move.

B.7 ElementEvents

Provides a concrete class that exposes element events from within Review. A client may subscribe to these events by creating a new instance of the class and attaching to the provided event members.

B.7.1 Members

Member	Description
ElementMaterialChangedEvent	Occurs when the material of an element changes.

Member	Description
ElementVisibilityTypeChangedEvent	Occurs when the visibility type of an element changes.

Member	Description
ElementSelectionChangedEvent	Occurs when the active selection changes

Member	Description	
ElementEvents	Creates an ElementEvents object	
Argument	**Type**	**Description**
M	Aveva.VPD.ReviewApi.IElementManager	The Element Manager object.

B.8 IElementManager

Provides an interface for the management of elements within Review. This should be used to get the interface to a specific element or actions pertaining to all elements in the model.

B.8.1 Members

Member	Description	
GetElement	Retrieves an IElement object for the specified element after checking the element exists. Throws an ArgumentException if the element doesn't exist.	
Argument	**Type**	**Description**
name	string	The name of the element to be retrieved.

Member	Description	
GetElement	Retrieves an IElement object for the specified element. If checkExists is set and the element does not exists then an ArgumentException is thrown.	
Argument	**Type**	**Description**
name	string	The name of the element to be retrieved.
checkExists	bool	Check if the element exists.

Member	Description
RootElement	Gets the root element for the current model

Member	Description
SelectedElements	Gets an array of the elements in the Active Selection

Member	Description	
SetSelectedElements	Sets an array of elements to the Active Selection.	
Argument	**Type**	**Description**
sender	object	The request sender.
elements	IElement[]	The elements to be set.

Member	Description	
SetSelectedElementNames	Sets an array of element names to the Active Selection.	
Argument	**Type**	**Description**
sender	object	The request sender.
elements	string[]	The element names to be set.

Member	Description	
ElementExists	Retrieves a Boolean value indicating whether the specified element exists	
Argument	**Type**	**Description**
name	string	The name of the element to be evaluated.

Member	Description
SetAllElementsVisibilityType	Sets the visibility type for all elements in the current model

Argument	Type	Description
visibilityType	Aveva.VPD.ReviewApi. VisibilityType	The visibility type to be applied.

Member	Description	
SetAllElementsMaterial	Sets the material for all elements in the current model	
Argument	**Type**	**Description**
material	Aveva.VPD.ReviewApi.IMaterial	The material to be applied

Member	Description	
SetElementsVisibilityType	Sets the visibility type for the specified elements	
Argument	**Type**	**Description**
elements	Aveva.VPD.ReviewApi.IElement[]	The elements to be changed
visibilityType	Aveva.VPD.ReviewApi.VisibilityType	The visibility type to be applied

Member	Description	
SetElementsMaterial	Sets the material for the specified elements	
Argument	**Type**	**Description**
elements	Aveva.VPD.ReviewApi.IElement[]	The elements to be changed.
material	Aveva.VPD.ReviewApi.IMaterial	The material to be applied.

Member	Description
FreezeMaterials	Freeze the current associations state between elements and materials. This provides the state to which ResetMaterials method will revert.

Member	Description
ResetMaterials	Reset the material name associated with each element to those at the last frozen. Initially the frozen state is that contained within a Review status file.

B.9 IMaterial

Provides interface for a particular material. This should be used for material specific actions such as setting its colour and lighting properties.

B.9.1 Members

Member	Description
Name	Gets the name of the material

Member	Description
GetMaterialInfo	Retrieves a MaterialInfo object for the material

Member	Description	
SetMaterialInfo	Sets the MaterialInfo object for the material	
Argument	**Type**	**Description**
materialInfo	Aveva.VPD.ReviewApi.MaterialInfo	The required MaterialInfo object.

Member	Description
Colour	Gets or sets the colour of the material

Member	Description
Ambient	Gets or sets the ambient value of the material [0 .. 100]

Member	Description
Specular	Gets or sets the specular value of the material [0 .. 100]

Member	Description
Metalness	Gets or sets the metalness value of the material [0 .. 100]

Member	Description
Smoothness	Gets or sets the smoothness value of the material [0 .. 100]

Member	Description
Transparency	Gets or sets the transparency value of the material [0 .. 100]

Member	Description
VisibilityType	Gets or sets the visibility type of the material

Member	Description
Delete	Deletes the material

B.10 MaterialEvents

Provides a concrete class that exposes material events from within Review. A client may subscribe to these events by creating a new instance of the class and attaching to the provided event members.

B.10.1 Members

Member	Description
MaterialChangedEvent	Occurs when a material changes

Member	Description
MaterialCreatedEvent	Occurs when a material is created

Member	Description
MaterialDeletedEvent	Occurs when a material is deleted

Member	Description	
MaterialEvents	Creates a MaterialEvents object	
Argument	**Type**	**Description**
m	Aveva.VPD.ReviewApi.IMaterialManager	The Material Manager object.

B.11 IMaterialManager

Provides an interface for the management of materials within Review. This should typically be used for creating, deleting and enumerating materials.

B.11.1 Members

Member	Description
CreateMaterial	Creates a material

Argument	Type	Description
Name	string	The name of the material to be created.
materialInfo	MaterialInfo	A MaterialInfo object for the material.

Member	Description	
DeleteMaterial	Deletes the specified material	
Argument	**Type**	**Description**
material	Aveva.VPD.ReviewApi.IMaterial	The material to be deleted.

Member	Description	
DeleteMaterial	Deletes the specified material	
Argument	**Type**	**Description**
name	string	The name of the material to be deleted.

Member	Description	
GetMaterial	Retrieves the material of the specified name	
Argument	**Type**	**Description**
name	string	Retrieves the material of the specified name.

Member	Description
AllMaterials	Gets an array of all the materials in the current model

Member	Description	
MaterialExists	Retrieves a Boolean value indicating whether the specified material exists.	
Argument	**Type**	**Description**
name	string	The name of the material to be evaluated.

B.12 UserMessage

Provides a class that enables passing of user defined objects to other subscribers of user events.

B.12.1 Members

Member	Description	
UserMessage	Create new user message to raise through the API	
Argument	**Type**	**Description**
Message	Object	User defined object or class to pass through the API

Member	Description	
Message	Retrieve user-defined message payload	
Argument	**Type**	**Description**
None		

B.13 IUserEventManager

Provides an interface to events raised within Review containing user defined objects.

B.13.1 Members

Member	Description	
RaiseUserEvent	Raises a new user event with a user defined payload	
Argument	**Type**	**Description**
message	Aveva.VPD.ReviewApi.UserMessage	The message to raise

B.14 UserEvents

Provides a concrete class that exposes user events from within Review. A client may subscribe to these events by creating a new instance of the class and attaching to the provided event members.

B.14.1 Members

Member	Description	
UserEvents	Creates a UserEvents object	
Argument	**Type**	**Description**
M	Aveva.VPD.ReviewApi.IUserEventManager	The UserEventManager object.

Member	Description
UserEvent	Occurs a user event is raised.

B.15 Other ReviewAPI Classes

B.15.1 MaterialInfo

The MaterialInfo class is used to define the visual properties of Review materials. The MaterialInfo class contains the following members:

Member	Type	Description
Red	System.Int32	The red value of the colour of the material in the range 0-100
Green	System.Int32	The green value of the colour of the material in the range 0-100
Blue	System.Int32	The blue value of the colour of the material in the range 0-100
Ambient	System.Int32	The ambient reflectivity of the material in the range 0-100
Specular	System.Int32	The specular reflectivity of the material in the range 0-100
Metalness	System.Int32	Defines the amount of plastic-metal in the material. This is defined in the range 0-100 with 0 being plastic and 100 being metal.
Smoothness	System.Int32	Defines how smooth the material is. This is defined in the range 0-100 with 0 being rough and 100 being smooth.
Transparency	System.Int32	Defines how transparent the material is. This is defined in the range 0-100 with 0 being opaque and 100 being transparent.

B.15.2 ReviewActiveSelection

The ReviewActiveSelection class provides access to the list of selected elements in Review. Using this class an add-in can query or set the list of selected elements and subscribe to an event that is fired when the selection changes. The ReviewActiveSelection class contains the following members:

Member	Description
SelectionChanged	Sets the selection and fires an event to all subscribers that the selection has changed.

Argument	Type	Description
sender	System.Object	The object that is setting the selection.
selection	System.Collections.ArrayList	An ArrayList of String objects containing the names of the selected elements.

Member	Description	
SubscribeForSelectionChangedEvent	Subscribes to the event that is fired when the active selection changes. In Review 6.2 the selection changed event is triggered by selection changes in the Explorer, **Observer View**, Camera views and the Search Results window.	
Argument	**Type**	**Description**
E	ReviewActiveSelection.SelectionChangedEvent	The function to act as an event handler for the selection changed event.

Appendix C Review Command Line User Guide

In addition to controlling REVIEW by using the standard forms and menus, you can enter explicit commands by using the **Applications** facility (see section 1.3.1) You would normally use this option by storing such commands in a macro file and then running the macro, rather than by entering the commands one-by-one.

If you wish to customise your REVIEW installation by writing command macros, with the added option of designing your own forms and menus from which to run the macros, see the *Cadcentre Software Customisation Guide* for details of how to do so.

C.1 Sending Commands to REVIEW

You may send command lines to REVIEW in one of two ways:

- Automatically, as soon as the *newline* character (Return) is entered to terminate the command line.
- In batch mode, by entering an explicit instruction to send one or more previously entered command lines.

REVIEW refreshes its display every time a received instruction has been completely processed, which can make the automatic sending of each command line inefficient compared with batch mode operation (where the display is refreshed only once for the whole command sequence).

- To initiate automatic sending of commands on a line-by-line basis, use the command

  REVIEW AUTOsend ON

- To stop the automatic sending of commands and revert to batch mode (which is the default), use the command

  REVIEW AUTOsend OFF

- To pass a batch of commands to REVIEW explicitly (only valid with Autosend mode Off), use the command

  REVIEW SEND

This command will send all command lines which have been entered since the preceding REVIEW SEND command. Consider, for example, the following command lines (which are numbered for reference purposes only):

```
1.  REVIEW MATERIAL 1 RGB 10 10 10
2.  REVIEW ELEMENT /C1101 MATERIAL 1
3.  REVIEW SEND
4.  REVIEW ELEMENT /C1002 MATERIAL 1
5.  REVIEW SEND
```

By default, batch mode is in operation (i.e. Autosend mode is Off). Therefore lines 1 and 2, which hold REVIEW functional commands, are not passed to REVIEW until the explicit command to do so is given in line 3.

Similarly, the command in line 5 causes line 4 (only) to be passed to REVIEW.

C.2 Handling Errors Returned from REVIEW

When using batch mode operation, you can send a sequence of commands to REVIEW, any of which may cause an error. For example, the command

```
REVIEW ELEMENT /PUMP1 COLOUR 20
```

could fail because REVIEW has no knowledge of the element /PUMP1.

When REVIEW is processing a batch of commands, a detected error will prevent any part of the current command line from being executed. The error will be logged by REVIEW and execution will pass to the next command line, and so on until all command lines in the batch have been dealt with. At the end of the process, REVIEW will have a list of error numbers (if any), together with the corresponding error messages. The way in which you handle the errors after processing depends on the number of errors detected. If a single error is detected, you can deal with it as explained in Section C.1; if multiple errors are detected, they are dealt with as explained in Section C.2.

C.2.1 Returning a Single Error Message

If REVIEW detects a single error only, then that error can be identified unambiguously and an appropriate PML HANDLE function can deal with it immediately. (See the *Cadcentre Software Customisation Guide* for details of the PML2 error handling facilities.)

The single errors which may be returned in this way are:

(79, 301) Element *element_name* does not exist
(79, 302) *attribute* out of range
(79, 303) File *filename* not found
(79, 304) Review Machine not Fog capable
(79, 306) Any error not covered by the preceding message numbers. The actual message output will be that returned when the error is detected; for example, a message saying that a file is of the wrong type to be read in.

C.2.2 Returning Multiple Error Messages

If REVIEW detects more than one error in a batch of commands, it returns a special composite error message in which all of the individual error messages are concatenated into a single message line. Such a message always has the error number (79, 305) and the message prefix 'Review Multiple Error:' For example,

```
(79, 305) Review Multiple Error: Element /PUMP1 does not exist.
Material number out of range.
```

The length of the error message is truncated to 120 characters.

Such a message is for information purposes only; there is no mechanism for handling multiple errors automatically.

C.3 Defining Material Properties

These commands allow you to define how a specified material (identified by its reference number; an integer in the range 1-64) is displayed in terms of its colour, surface properties, and visibility. This enables you to change the appearance of elements so as to indicate the settings of one or more relevant attributes read from the database (such as built state, maintenance schedule, supplier, etc.)

- To define the colour of material number *integer*:

  REVIEW MATerial *integer* **RGB** *integer1 integer2 integer3*

where *integer1*, *integer2* and *integer3*, which specify the red, green and blue components, respectively, are each in the range 0-100. (Note: These are *not* percentages and so do not have to add up to 100.)

- To define the ambient reflectivity of material number *integer*:

  REVIEW MATerial *integer* **AMBient** *integer**

  where *integer** is in the range 0-100.

- To define the specular reflectivity of material number *integer*:

  REVIEW MATerial *integer* **SPECular** *integer**

  where *integer** is in the range 0-100.

- To define the shininess of material number *integer*:

  REVIEW MATerial *integer* **SHIny** *integer**

  where *integer** is in the range 0-100.

- To define the degree of visibility of material number *integer*, use one of the following:

  REVIEW MATerial *integer* **VISible**

  REVIEW MATerial *integer* **TRANSlucent**

  REVIEW MATerial *integer* **INVISible**

  REVIEW MATerial *integer* **WIREframe**

C.4 Defining How Individual Elements are Displayed

These commands allow you to define how a named element is to be displayed in terms of an associated material definition and visibility. This has similar applicability to the material definitions described in Section C.3, but allows more selective control of the appearance of individual items.

- To define the material to be used to represent a named element:

  REVIEW ELEment *name* **MATerial** *integer*

where the material definition has been defined as explained in Section C.3. For example,

```
REVIEW ELEMENT /C1101 MATERIAL 16
```

will display element /C1101 (where /C1101 corresponds to the tag name in REVIEW) using the current settings defined for material 16.

- To define the degree of visibility, use one of the following:

  REVIEW ELEment *name* **VISible**

  REVIEW ELEment *name* **TRANSlucent**

  REVIEW ELEment *name* **INVISible**

  REVIEW ELEment *name* **WIREframe**

(Note that these override any definition of visibility incorporated in the material definition associated with the named element.)

- To restore all elements to their original material settings, as defined in the model file:

  REVIEW ELEment RESET

C.5 Defining Light Sources

These commands allow you to define the attributes of light sources in terms of their colour, intensity, type (local or infinite) and, for an infinite source, direction. Each light source is identified by its reference number (an integer in the range 1-7).

- To switch light source *integer* on or off:

  REVIEW LIGHT *integer* **ON**
  REVIEW LIGHT *integer* **OFF**

- To define the colour of light source *integer*:

  REVIEW LIGHT *integer* **RGB** *integer1 integer2 integer3*

where *integer1*, *integer2* and *integer3*, which specify the red, green and blue components, respectively, are each in the range 0-100. (Note: These are *not* percentages and so do not have to add up to 100.)

- To define the intensity of light source *integer*:

  REVIEW LIGHT *integer* **INTensity** *integer**

where *integer** is in the range 0-100.

- To define a local light source:

  REVIEW LIGHT *integer* **LOCal POSition** *coord1 coord2 coord3*

where *coord1*, *coord2* and *coord3* are the coordinate values which specify the position of the light source.

- To define an infinite (i.e. parallel) source, use either of the following formats:

  REVIEW LIGHT *integer* **INFinite MODel** <direction>

specifies an infinite light positioned with respect to the model (like the sun).

REVIEW LIGHT *integer* **INFinite VIEWer** <direction>

specifies an infinite light positioned with respect to the viewer's eye point (like a spotlamp held by the viewer).

In each case, the direction of the light, shown as <direction> in the above command lines, may be specified as bearing and elevation angles by appending the commands

BEARing *value* (*value* is in the range 0-360)
ELEVation *value* (*value* is in the range +90 to -90)

For example, the following command line specifies that light 2 should be an infinite light whose direction with respect to the model is from the South with an elevation angle of 45 degrees:

```
REVIEW LIGHT 2 INFINITE MODEL BEARING 180 ELEVATION 45
```

NOTE: When setting the direction of an Infinite-wrt-Model light, the bearing and elevation settings define the absolute direction of the light. When setting the direction of an Infinite-wrt-Viewer light, the bearing and elevation settings are defined relative to a viewer looking North. The default direction for an Infinite-wrt-Viewer light is such that it shines from behind the viewer.

C.6 Defining Camera Settings

These commands allow you to define the attributes of cameras (each of which corresponds to a particular view of the REVIEW model) in terms of their position, view direction, and field of view. Each camera is identified by its reference number (an integer in the range 0-7).

NOTE: In all of the following camera-setting commands, **REVIEW OBServer** may be substituted for **REVIEW CAMera 0**.

- To define the position of a camera:

  REVIEW CAMera *integer* **POSition** *coord1 coord2 coord3*

places the camera at the point defined by the coordinates *coord1*, *coord2* and *coord3*.

REVIEW CAMera *integer* **POSition** *name*

places the camera at the origin of a named element.

- To define the view direction in terms of a through-point, that is, a point through which the line of sight is to pass:

  REVIEW CAMera *integer* **THROughpoint** *coord1 coord2 coord3*

directs the line of sight through the point defined by the coordinates *coord1*, *coord2* and *coord3*.

REVIEW CAMera *integer* **THROughpoint** *name*

directs the line of sight through the origin of a named element.

REVIEW CAMera *integer* **THROughpoint** *name* **HIGHlight**

directs the line of sight through the origin of a named element and confirms that element's name on the REVIEW display.

- To define the view direction explicitly in terms of a bearing, elevation, and roll angle, use a combination of the following:

  REVIEW CAMera *integer* **BEARing** *value*

  (*value* is in the range 0-360)

  REVIEW CAMera *integer* **ELEVation** *value*

  (*value* is in the range -90 to +90)

  REVIEW CAMera *integer* **ROLL** *value*

  (*value* is in the range -180 to +180)

- To define the field of view, that is, the angle subtended at the viewing point by the displayed area of the model, use any one of the following:

  REVIEW CAMera *integer* **FIELd** *value*

  (*value* is in the range 0-180)

  REVIEW CAMera *integer* **FIELd OF VIEW** *value*

  (*value* is in the range 0-180)

  REVIEW CAMera *integer* **FOV** *value*

  (*value* is in the range 0-180)

- To define the background colour for a particular camera view in terms of its red, green and blue components:

  REVIEW CAMera *integer* **RGB** *integer1 integer2 integer3*

where *integer1*, *integer2* and *integer3*, which specify the red, green and blue components, respectively, are each in the range 0-100. (Note: These are *not* percentages and so do not have to add up to 100.)

- To switch between colour-shaded and wireframe views for a particular camera:

  REVIEW CAMera *integer* **SHAded**
  REVIEW CAMera *integer* **WIREframe**

C.7 Controlling Fog Effects

These commands allow you to add simulated fog to the display and to control its colour.

- To switch fog on or off:

  REVIEW FOG ON
  REVIEW FOG OFF

- To define the colour of the fog in terms of its red, green and blue components:

  REVIEW FOG RGB *integer1 integer2 integer3*

where *integer1*, *integer2* and *integer3*, which specify the red, green and blue components, respectively, are each in the range 0-100. (Note: These are *not* percentages and so do not have to add up to 100.)

C.8 Defining How Much of the Model is Drawn

These commands allow you to define a named clip volume in terms of the coordinates of two diagonally opposed corners. This enables you to create a clip volume containing only, say, those parts of the model for which relevant database attributes have a particular setting, so that only the corresponding elements are displayed by REVIEW when that clip volume is applied.

- To define a named clip volume:

REVIEW CLIP *clip_name* **DEFine MIN** *coord1 coord2 coord3* **MAX** *coord4 coord5 coord6*

where *clip_name* is a text string which identifies the clip volume whose opposite corners are at the coordinates (*coord1, coord2, coord3*) and (*coord4, coord5, coord6*).

- To redefine one corner only of an existing clip volume, use one of the following:

  REVIEW CLIP *clip_name* **DEFine MIN** *coord1 coord2 coord3*
  REVIEW CLIP *clip_name* **DEFine MAX** *coord4 coord5 coord6*

- To apply the constraints of a named clip volume to REVIEW's display, use one of the following:

  REVIEW CLIP *clip_name* **OUTside**
  REVIEW CLIP *clip_name* **INside**
  REVIEW CLIP *clip_name* **LOCalinside**

REVIEW CLIP *clip_name* **OUTside** cancels any existing clipping and removes from the display all elements which are wholly outside the specified clip volume.

REVIEW CLIP *clip_name* **INside** cancels any existing clipping and removes from the display all elements which are wholly or partially inside the specified clip volume.

REVIEW CLIP *clip_name* **LOCalinside** leaves any existing clipping unchanged and, in addition, removes from the display all elements which are wholly or partially inside the specified clip volume.

- To restore the full display by cancelling all existing clipping:

  REVIEW CLIP UNDO

C.9 Setting Translational and Rotational Increments

These commands allow you to specify the maximum amount by which the viewer or a group can move for each zoom, rotate or pan operation in REVIEW. The default settings are a translational increment of 1000 mm and a rotational increment of 10 degrees. (For a group, only the translational increment is relevant).

- To specify the maximum translational and rotational increments for the viewer:

  REVIEW INCrement OBServer TRANSlation *value*

  (*value* is in mm)

  REVIEW INCrement OBServer ANGLE *value*

  (*value* is in degrees)

- To specify the maximum translational increment for a group:

  REVIEW INCrement GROup TRANSlation *value*
  (*value* is in mm)

C.10 Linking Elements into Groups

This command allows you to create named groups, each of which links a number of displayed elements which are to be handled in a common way; typically for animation purposes, where the group of elements is moved as a single entity. The elements to be included in such a group can be selected by interrogating the database, so that only those items for which relevant database attributes have a particular setting are included.

- To define the position and members of a named group:

  REVIEW GROup *group_name* **ORIGIN** *coord1 coord2 coord3 element_list*

where *group_name* is a text string which identifies the group, the origin is at the position defined by *coord1*, *coord2* and *coord3*, and the members are all the elements defined by *element_list*.

C.11 Tagging Displayed Elements

This command allows you to identify an element in the display by showing its name in an adjacent tag.

- To add a name tag to a specific element:

  REVIEW TAG *name*

where *name* identifies the element to be tagged.

- To delete a single tag definition:

  REVIEW TAG DELETE *name*

- To delete all current tag definitions:

  REVIEW TAG DELETE ALL

C.12 Labelling Displayed Elements

This command allows you to attach a label containing a line of descriptive text to an element in the display.

- To add a label to a specific element:

  REVIEW LABEL *name text*

where *name* identifies the element to be labelled and *text* is the text string which is to appear in the label.

For example,

```
REVIEW LABEL /V2302 'Fuel feed control valve'
```

- To delete a single label definition:

  REVIEW LABEL DELETE *name*

- To delete all current label definitions:

  REVIEW LABEL DELETE ALL

C.13 Loading a Model File or Status File into REVIEW

These commands allow you to load a named model file and/or a configurational status file. You should ensure that the loaded status file is compatible with the current model file, since REVIEW does not check that this is so.

- To load a model file:

  REVIEW LOAD MODel *filename*

For example,

```
REVIEW LOAD MODEL /stab.model
```

- To load a status file:

  REVIEW LOAD STAtus *filename*

For example,

```
REVIEW LOAD STATUS /stab.status
```

C.14 Command Reference Section

This section summarises the REVIEW commands in a standardised format. The conventions used in the presentation of the command syntax are explained first, followed by details of the individual commands in alphabetic order.

C.14.1 How the Command Syntax is Represented

The commands described in the main part of this appendix have their legal command and interrogation options presented in the form of syntax diagrams. These diagrams formalise the precise command sequences which may be used and supplement the explanations given in the appropriate sections of this manual.

The following conventions apply to the syntax diagrams in this appendix:

- Names written in lowercase letters enclosed in angled brackets (e.g. <direction>) represent subsidiary syntax diagrams. Such names are used for cross-reference purposes within other syntax diagrams.
- Commands to be input from the terminal are shown in a combination of uppercase and lowercase letters. In general, these commands can be abbreviated; the capital letters indicate the minimum permissible abbreviation. (NOTE: This convention does *not* mean that the second part of the command must be typed in lowercase letters; commands may be entered in any combination of uppercase and lowercase letters.)

For example, the command

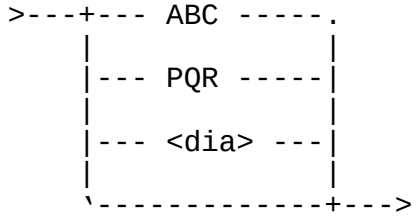
```
ELEment
```

may be input in any of the following forms:

```
ELE
ELEM
ELEME
ELEMEN
ELEMENT
```

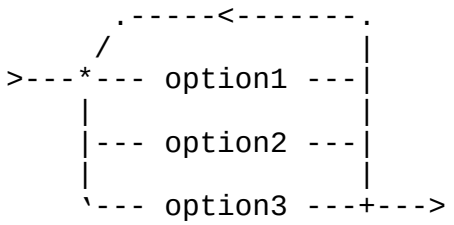
Commands shown *wholly* in uppercase letters cannot be abbreviated.

- Names written in lowercase italics are command arguments (see Section C.28.2).
- Syntax diagrams are generally read from top left to bottom right.
- Points marked with a plus sign (+) are option junctions which allow you to input any *one* of the commands to the right of the junction. Thus



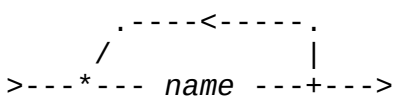
means you may type in ABC *or* PQR *or* any command allowed by the syntax given in subsidiary syntax diagram <dia> *or* just press RETURN to get the default option.

- Points marked with an asterisk (*) are loop back junctions. Command options following these may be repeated as required. Thus



permits any combination of option1 *and/or* option2 *and/or* option3 to be used (where the options may define commands, other syntax diagrams, or command arguments). This may form an exception to the rule of reading from top left to bottom right.

The simplified format



means that you may type in a list of PDMS names, separated from each other by at least one space.

NOTE: The need to press the Return (or Enter) key to complete each command line is implicit in all syntax diagrams and is not usually shown. Only in cases where the need to press Return/Enter has some particular significance is this indicated specifically by the abbreviation *nl*.

C.14.2 Command Arguments

These are inputs which are necessary to qualify command words. They are distinguished by appearing in italics.

Name	Definition	Example
filename	The pathname of a file	/DATLISTS/SITE1
int	A positive integer	0, 3
name	A PDMS element name	/ABCD
nodeid	A host machine identifier	'pc83'
text	An alphanumeric string	'Enclose between apostrophes' or |enclose between vertical bars|
val	A positive or negative number	3.142, -23.66, -34
varid	A variable identifier	3, !NAME
nl	New line	Press Return, Enter or ↵ key (depending on your workstation keyboard)

Table C-1 Examples of basic command arguments

C.14.3 The Commands

This section gives the full syntax of all the REVIEW commands, in alphabetic order.

The information is given under the following headings:

Description:

A brief explanation of what the command enables you to do and when you might use it.

Example:

Examples of the permitted command variations. (Examples are omitted in trivial cases.)

Syntax:

The full command syntax, given in the diagrammatic form explained in Section C.14.1.

AUTOREFRESH

Description: Switches Autorefresh Mode On or Off.

When Autorefresh Mode is On, any REVIEW command sent to REVIEW that alters REVIEW's graphics will cause a refresh.

When Autorefresh Mode is Off, REVIEW's graphics will not be refreshed as a result of a REVIEW command. This is useful when commands are sent in batch mode. Note that refreshes resulting from user interaction with REVIEW are not affected.

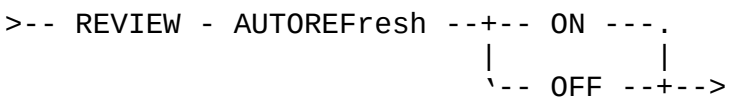
If autorefresh is switched from off to on, any pending refresh will be seen.

If the user quits from REVIEW applications then autorefresh is set to on, and any pending refresh will be seen.

Examples:

```
REVIEW AUTOREFRESH ON
REVIEW AUTOREFRESH OFF
```

Syntax:



AUTOSEND

Description: Switches Autosend Mode On or Off.

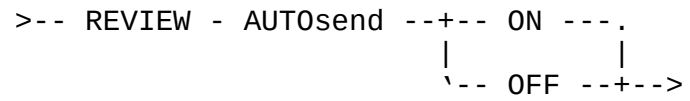
When Autosend Mode is On, each command line is sent to REVIEW as soon as a *newline* character is encountered.

When Autosend Mode is Off, command lines are not sent to REVIEW until an explicit SEND command is issued. This allows commands to be sent in batch mode.

Examples:

```
REVIEW AUTOSEND ON
REVIEW AUTOSEND OFF
```

Syntax:



CAMERA

Description: Sends REVIEW control commands to define the attributes of a camera (position of viewpoint, direction of view, field of view, background colour, etc.)

Examples:

```
REVIEW CAMERA 0 POSITION 500 1000 250
REVIEW OBSERVER POSITION 500 1000 250
```

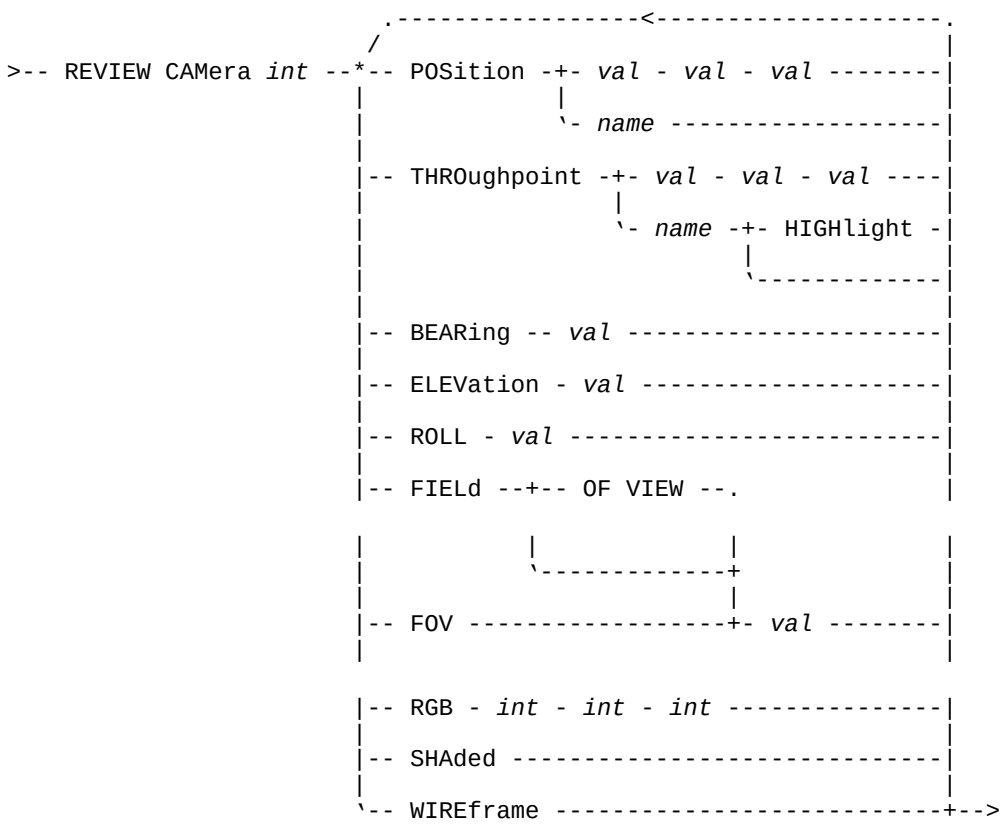
Sets viewpoint to XYZ (ENU) coordinates (500, 1000, 250). (OBSERVER = CAMERA 0)

```
REVIEW CAMERA 2 THROUGH /C1002 HIGH
```

Sets view direction towards origin of named element and shows element name in display.

```
REVIEW CAMERA 2 BEARING 135     Sets bearing angle to 135° (SE).
REVIEW CAMERA 2 ELEVATION -45   Sets elevation to 45° down (negative).
REVIEW CAMERA 2 ROLL 30         Sets roll angle to 30° clockwise, as viewed
                                along line of sight.
REVIEW CAMERA 2 FOV 60          Sets field of view to subtended angle of 60°.
REVIEW CAMERA 2 RGB 15 50 30    Defines background colour.
```

Syntax:


>-- REVIEW CAMera int --*-- POSition -+- val - val - val --------|
| | |
| `- name --------------------------|
| |
|-- THROughpoint -+- val - val - val ----|
| | |
| `- name -+- HIGHlight -|
| | |
| `-------------|
| |
|-- BEARing -- val -----------------------|
| |
|-- ELEVation - val ----------------------|
| |
|-- ROLL - val ---------------------------|
| |
|-- FIELd --+-- OF VIEW --. |
| | | |
| `-------------+ |
| | |
|-- FOV -------------------+- val --------|
| |
|-- RGB - int - int - int ----------------|
| |
|-- SHAded -------------------------------|
| |
`-- WIREframe ----------------------------+-->
FIELd --+-- OF VIEW --.
OF VIEW
FOV

CLEAR

Description: Clears the REVIEW command buffer.

This is useful during an interactive session, allowing you to change your mind and cancel preceding inputs before you use the REVIEW SEND command.

Examples:

```
REVIEW CAMERA 0 POS 500 100 200
REVIEW LIGHT 2 ON RGB 15 30 25
REVIEW MATERIAL 3 TRANSLUCENT
REVIEW CLEAR              Empties the REVIEW command buffer
REVIEW CAMERA 0 POS 500 300 100
REVIEW SEN                    Sends only the command line entered
since                         the CLEAR command
```

Syntax:

```
>-- REVIEW - CLEAR -->
```

CLIP

Description: Sends REVIEW control commands to define a named clip volume in terms of the coordinates of two diagonally opposed corners and allows you to remove from the display all elements which lie inside or outside such a clip volume.

Examples:

```
REVIEW CLIP 'CVOL2' DEFINE MIN 500 1000 250 MAX 1500 2500
750
```

Defines clip volume CVOL2 as the 3D spatial box with opposite corners at coordinates (500, 1000, 250) and (1500, 2500, 750).

```
REVIEW CLIP 'CVOL2' DEFINE MIN 250 1500 250
```

Modifies existing clip volume by moving one corner only.

```
REVIEW CLIP 'CVOL2' OUTSIDE
```

Cancels any existing clipping and clips all elements which are wholly outside the named clip volume.

```
REVIEW CLIP 'CVOL2' INSIDE
```

Cancels any existing clipping and clips all elements which are wholly or partially inside the named clip volume.

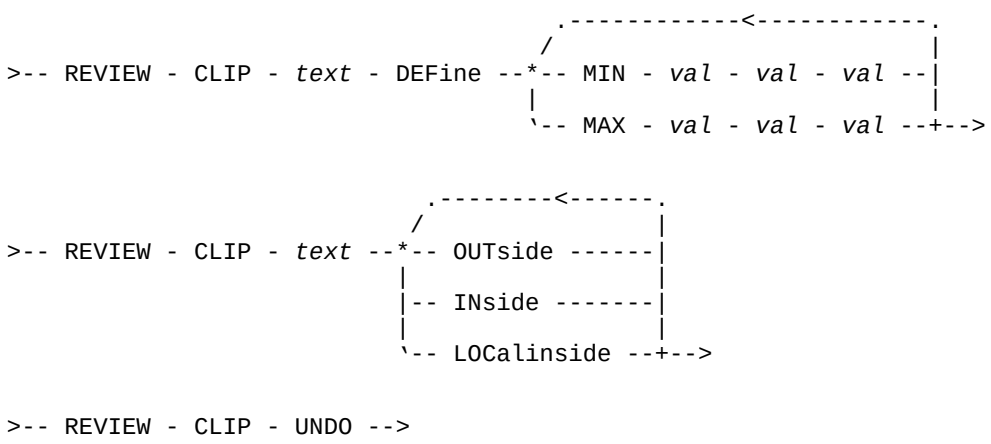
```
REVIEW CLIP 'CVOL2' LOCALINSIDE
```

```
REVIEW CLIP 'CVOL3' LOCAL
```

Each command line clips all elements which are wholly or partially inside the named clip volume while retaining any existing clipping from preceding commands.

`REVIEW CLIP UNDO` Cancels all clipping.

Syntax:


>-- REVIEW - CLIP - text - DEFine --*-- MIN - val - val - val --|
|
`-- MAX - val - val - val --+-->
>-- REVIEW - CLIP - text --*-- OUTside ------|
|
|-- INside -------|
|
`-- LOCalinside --+-->
>-- REVIEW - CLIP - UNDO -->

ELEMENT

Description: Sends REVIEW control commands to define the appearance of specified elements in the display.

Examples:

```
REVIEW ELEMENT /C1101 MATERIAL 2
```

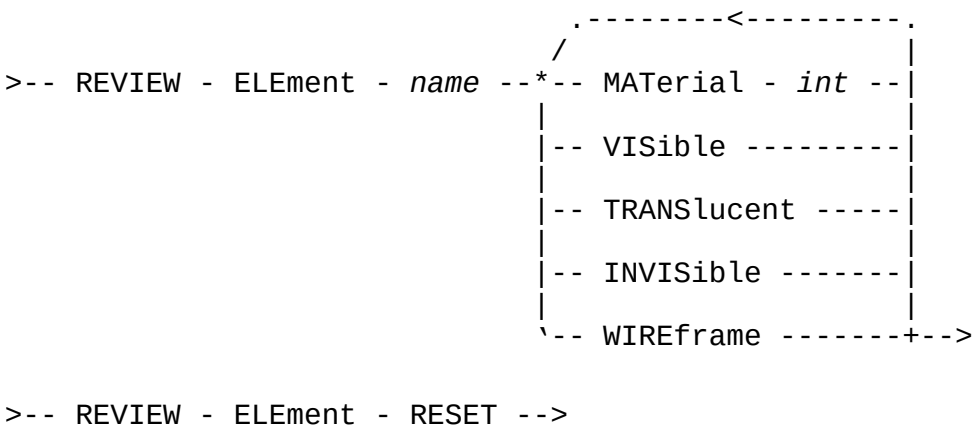
Displays element /C1101 using the properties currently defined for material 2.

```
REVIEW ELEMENT /C1101 VISIBLE
REVIEW ELEMENT /C1101 TRANSLUCENT
REVIEW ELEMENT /C1101 INVISIBLE
REVIEW ELEMENT /C1101 WIREFRAME
```

} Defines visibility of named element

`REVIEW ELEMENT RESET` Restores all elements to their original settings, as defined in the model file.

Syntax:



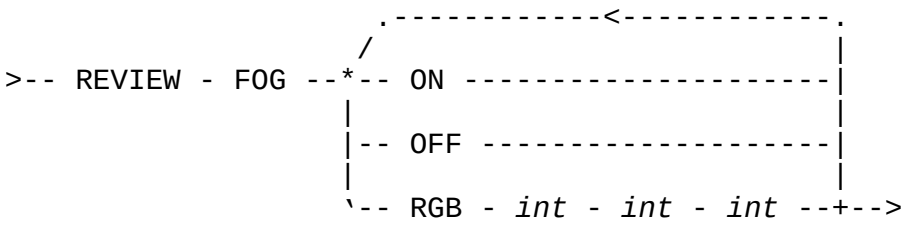
FOG

Description: Sends REVIEW control commands to simulate fog effects.

Example:

```
REVIEW FOG ON
REVIEW FOG OFF
REVIEW FOG RGB 25 75 25        Defines colour of fog in terms of its
                               red/green/blue components.
```

Syntax:



GROUP

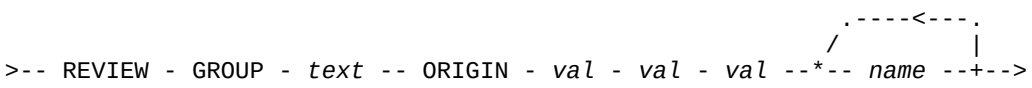
Description: Sends REVIEW control commands to define the position and member elements of a named group. Such a group may be moved as a logical entity for the purposes of animation etc.

Example:

```
REVIEW GROUP 'GROUP-A' ORIGIN 1000 1000 200 /C1101 /C1102 /P1506
```

Defines a group named GROUP-A, with its origin at XYZ (ENU) coordinates (1000, 1000, 200) and with the named elements as its members.

Syntax:



INCREMENT

Description: Sends REVIEW control commands to define maximum translational and rotational increments for viewpoint and group manipulation operations.

Example:

```
REVIEW INCREMENT OBSERVER ANGLE 30
```

Sets maximum rotational stepsize for movement of observer's viewpoint to 30°.

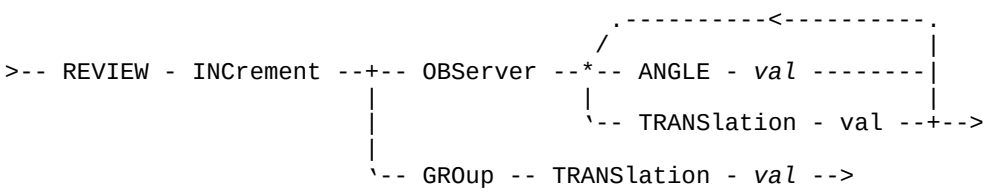
```
REVIEW INCREMENT OBSERVER TRANSLATION 500
```

Sets maximum translational stepsize for movement of observer's viewpoint to 500 mm.

```
REVIEW INCREMENT GROUP TRANSLATION 250
```

Sets maximum translational stepsize for movement of a group to 500 mm.

Syntax:


>-- REVIEW - INCrement --+-- OBServer --*-- ANGLE - val --------|
|
|

LABEL

Description: Sends a REVIEW control command to identify an element in the display by means of an attached label containing a specified text string.

Example:

`REVIEW LABEL /C1102 'Faulty Item'`	Attaches a label bearing the text 'Faulty Item' to the element /C1102.
`REVIEW LABEL DELETE /C1102`	Deletes label definition for named element.
`REVIEW LABEL DELETE ALL`	Deletes all current label definitions.

Syntax:

```
>-- REVIEW - LABEL - name - text -->

>-- REVIEW - LABEL - DELete -+- name -.
                            |        |
                            '- ALL --+-->
```

LIGHT

Description: Sends REVIEW control commands to define the properties of the light sources which illuminate the displayed model.

Example:

```
REVIEW LIGHT 3 ON
REVIEW LIGHT 2 OFF
```

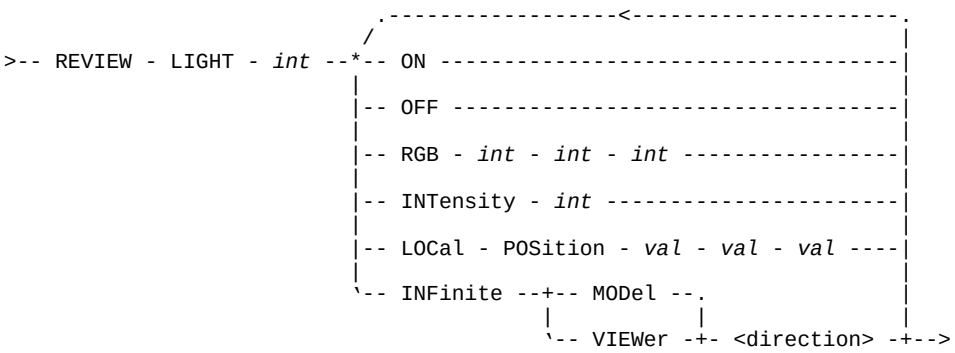
`REVIEW LIGHT 2 RGB 15 30 25` Defines red/green/blue colour mix for light.

`REVIEW LIGHT 2 INTENSITY 50` Defines intensity of illumination.

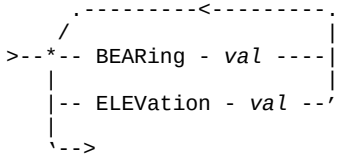
`REVIEW LIGHT 3 LOCAL POSITION 500 1250 500`
Defines a local light positioned at XYZ (ENU) coordinates (500, 1250, 500).

`REVIEW LIGHT 4 INFINITE MODEL BEARING 135 ELEVATION 45`
Defines infinite light source, positioned with respect to model, with direction 135° from North (i.e. SE) and 45° up.

Syntax:



where <direction> has the following syntax:



LOAD

Description: Sends REVIEW control commands to load a specified model file or status file.

Such files define the content of the display (elements making up the model) and the appearance of the display (view parameters etc.), respectively.

Examples:

```
REVIEW LOAD MODEL /atest.model
REVIEW LOAD STATUS /atest.status2
```

Syntax:

```
>-- REVIEW - LOAD --+-- MODel ---.
                    |            |
                    '-- STAtus --+-- filename -->
```

MATERIAL

Description: Sends REVIEW control commands to define the properties of specified materials (colour, texture, visibility, etc.)

Examples:

```
REVIEW MATERIAL 2 RGB 15 30 25
```
Defines red/green/blue colour mix.

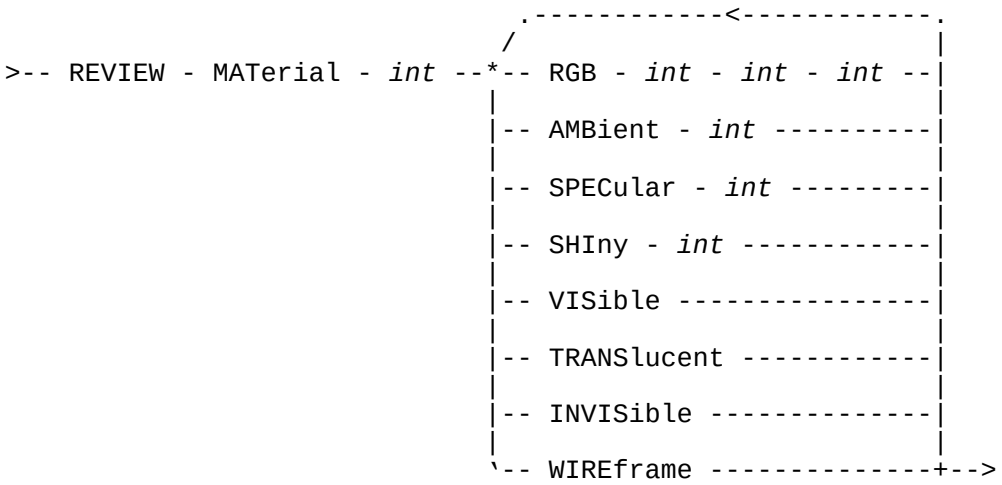
```
REVIEW MATERIAL 2 AMBIENT 50
```
Defines ambient reflectivity.

```
REVIEW MATERIAL 2 SPECULAR 30
```
Defines specular reflectivity.

```
REVIEW MATERIAL 2 SHINY 50
```
Defines material shininess.

```
REVIEW MATERIAL 2 VISIBLE
REVIEW MATERIAL 2 TRANSLUCENT
REVIEW MATERIAL 2 INVISIBLE
REVIEW MATERIAL 2 WIREFRAME
```
} Defines visibility of named element

Syntax:



OBSERVER

Description: Sends REVIEW control commands to define the attributes of an observer (position of viewpoint, direction of view, field of view, background colour, etc.)

Examples:

```
REVIEW OBSERVER MOVE /C1002 DYNAMIC HIGHLIGHT
```

Dynamically moves the observer in a number of steps towards origin of named element until element fills the display. A maximum of 15 steps are taken. If highlighting was off, it will be switched on so that the element will be highlighted and its name shown in the display. The default is a snap move (see next example) with highlighting off.

```
REVIEW OBSERVER MOVE /C1002 SNAP HIGHLIGHT
```

Moves the observer towards origin of named element in a single step, so the element fills the display. If highlighting was on, it will be switched off.

```
REVIEW OBSERVER 0 POSITION 500 1000 250
REVIEW OBSERVER POSITION 500 1000 250
```

Sets viewpoint to XYZ (ENU) coordinates (500, 1000, 250).

```
REVIEW OBSERVER 2 THROUGH /C1002 HIGH
```

Sets view direction towards origin of named element and shows element name in display.

```
REVIEW OBSERVER 2 BEARING 135
```

Sets bearing angle to 135° (SE).

```
REVIEW OBSERVER 2 ELEVATION -45
```

Sets elevation to 45° down (negative).

```
REVIEW OBSERVER 2 ROLL 30
```

Sets roll angle to 30° clockwise, as viewed along line of sight.

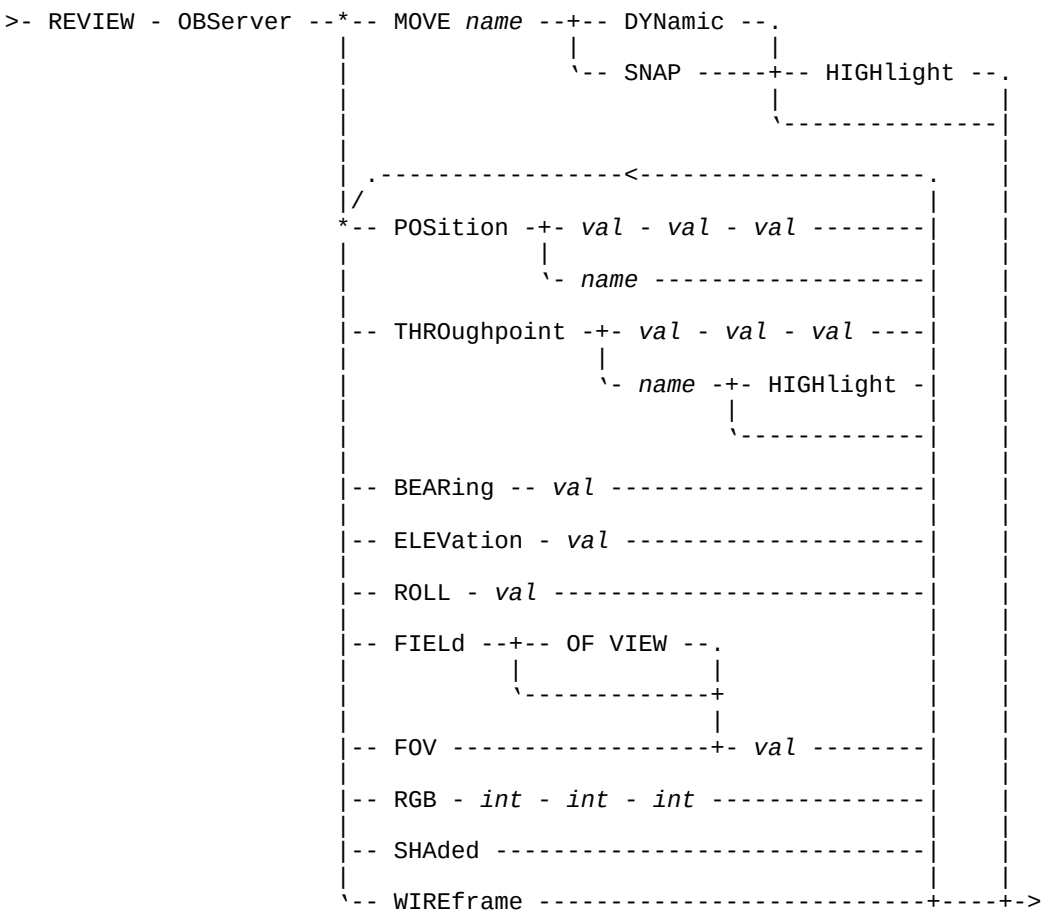
```
REVIEW OBSERVER 2 FOV 60
```

Sets field of view to subtended angle of 60°.

```
REVIEW OBSERVER 2 RGB 15 50 30
```

Defines background colour.

Syntax:


>- REVIEW - OBServer --*-- MOVE name --+-- DYNamic --.
MOVE name --+-- DYNamic --.
SNAP -----+-- HIGHlight --.
POSition -+- val - val - val --------
name -------------------
THROughpoint -+- val - val - val ----
name -+- HIGHlight -
BEARing -- val ----------------------
ELEVation - val ---------------------
ROLL - val --------------------------
FIELd --+-- OF VIEW --.
FOV ------------------+- val --------
RGB - int - int - int ---------------
SHAded -----------------------------
WIREframe --------------------------+----+->

SEND

Description: Applies only while the REVIEW Autosend Mode is Off (see AUTOSEND command).

Sends to REVIEW all command lines entered since the preceding SEND command was issued.

Examples:

```
REVIEW command line 1
REVIEW command line 2
REVIEW SEN            Sends command lines 1 and 2 to REVIEW
REVIEW command line 3
REVIEW command line 4
REVIEW SEN            Sends command lines 3 and 4 to REVIEW
```

Syntax:

```
>-- REVIEW -- SEND -->
```

SYSCOMMAND

Description: Allows you to issue a command to the operating system of the host computer from within REVIEW.

The effect of SYSCOMMAND applies only to the single command line which it begins. As soon as the operating system command has been executed, control is returned immediately to REVIEW.

Example:

`SYSCOM 'dir'` Lists the current directory in the operating system; usually the directory from which you entered REVIEW.

`SYSCOM 'edit $!filename'`
Runs the MS-DOS edit text-editing utility and opens the file referenced by the variable filename for viewing or editing.

Syntax:

`>-- SYSCOMmand --` *`text`* `-->`

where *text* represents any valid operating system command.

NOTE: Do not try to issue operating system commands which might disrupt REVIEW operations; for example, do not try to close, amend or delete files currently in use.

TAG

Description: Sends a REVIEW control command to identify an element in the display by means of an attached name tag. The element name is added to the tag automatically.

Example:

`REVIEW TAG /C1102`	Attaches a name tag bearing the text /C1102 to the corresponding element.
`REVIEW TAG DELETE /C1102`	Deletes tag from named element.
`REVIEW TAG DELETE ALL`	Deletes all current tags.

Syntax:

```
>-- REVIEW - TAG - name -->

>-- REVIEW - TAG - DELete -+- name -.
                           |        |
                           `- ALL --+-->
```

Appendix D Loading Large Model Files

D.1 Introduction

To load a model file into Review there must be sufficient memory available to the process. There is, however, a finite limit to the number of model primitives that can be loaded at any one time regardless of available memory due to a limitation on 32 bit Windows systems. The features described in this section provide a way to better manage which parts of the file are loaded into Review

Significant features include

- Fast indexing of segments
- Partial model loading and unloading
- Topping the loading of a model file

D.2 Fast Indexing

The indexing of segments in the model file has been optimised to improve the speed of loading large model files. This feature is 'on' by default, however, to ensure backwards compatibility an environment variable may be set to turn off this optimisation.

```
REVIEW_FAST_INDEXING=0
```

D.3 Partial Loading of Models

Large models require large amounts of hardware resources, both to display the model and more importantly to actually store the model in memory. The operating system provides page files to get around physical memory limits however when process memory requirements of greater than 1.5GB are required this too fails to solve the problem due to limitations of the Windows operating system.

Partial loading of models addresses this issue by initially trying a best-effort approach to loading the model, attempting to load as much of the model as possible within memory constraints. Once loaded, or partially loaded, you may then use the **Explorer** to load or unload segments (see section D.5). In this way you can unload unwanted segments to make way for other segments to be loaded.

This method differs from the classic loading by making two passes over the model file at load time, initially storing only the structure of the model, such as segment names and their children, reserving the loading of primitives until the complete structure has been successfully loaded. Once the structure is known you can load and unload segments without destroying the overall model layout.

As this feature is typically useful only for larger models it is disabled by default. To enable it the following environment variable must be set to 'on'.

```
REVIEW_PARTIAL_LOAD=1
```

Whilst Review will try to make a best-effort guess at the memory constraints of the system, each system is different and features such as the GUI and visualisation of the model require additional memory from the process in order that it can function normally.

By default, Review will unload the top level segment that failed to load successfully to maximise the amount of model loaded and allow the smallest amount of free memory to use for other requirements of the process.

It may be desired that on breaching the memory limit, Review should rollback further the segments loaded by the model and thus give more memory back to the process for use in other areas.

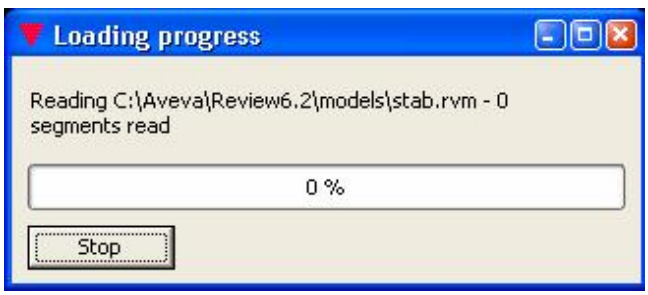
Although typically not required this can help alleviate problems when large models abort loading but cannot be displayed properly. The following environment variable should be set to the percentage of successfully loaded model that should be unloaded following a memory breach. This is set to '0' by default meaning that no additional segments should be unloaded.

```
REVIEW_PARTIAL_LOAD_ROLLBACK=20
```

D.4 Stopping a Model Load

When partial file loading is enabled it is possible to stop the file load at any time. While loading the progress dialog seen below will be displayed. Press the 'Stop' button at any time to stop the loading of the file.

After the load is stopped the parts of the model that have been loaded so far will be available in the Explorer.



With partial loading on the file will be loaded in two stages. The first will index the segments of the file and the second will load the primitives.

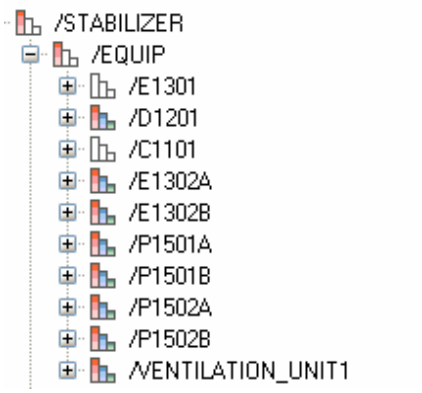
D.5 Loading and Unloading using the Explorer

With partial model loading enabled some extra functions are available from the Explorer that allows you to load and unload model parts. Unloading elements will free up memory space and potentially allow for other elements to be loaded.

Elements in the tree can be in one of three states; fully loaded, partially loaded or not loaded. The following icons identify the three states:

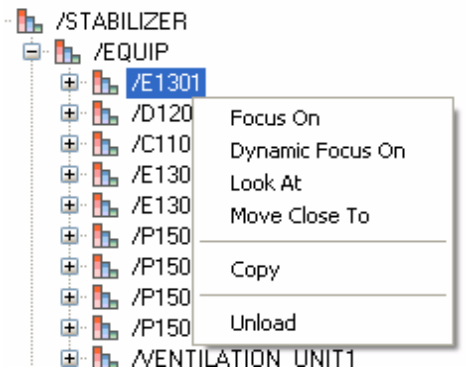
	Fully Loaded
	Partially loaded (some of the children of this element are not loaded)
	Not loaded

The three states can be seen in the tree below:



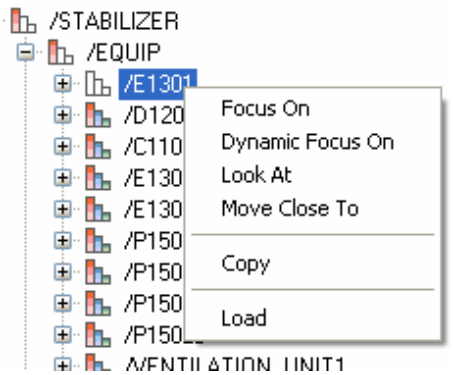
If a load of a large model file stopped due to memory limits before all elements could be loaded you can see from looking at the tree which elements have not been fully loaded.

To unload an element that is currently loaded select **Unload** from the shortcut menu for that element as seen below.



Using the multi-select feature of the tree it is possible to unload multiple elements at once.

Similarly, to load an element select **Load** from the shortcut menu.



=== End of Document ===